

### GENERAL DESCRIPTION

A mortgage loan is a loan which is secured by the collateral of a specified real estate property. The real estate pledged with a mortgage can be divided into two categories: residential and non-residential. Residential properties include houses, condominiums, cooperatives, and apartments. Residential real estate can be further subdivided into single-family (one- to four-family) and multifamily (apartment buildings in which more than four families reside). Nonresidential property includes commercial and farm properties. Common types of mortgages which have been securitized include traditional fixed-rate level-payment mortgages, graduated-payment mortgages, adjustable-rate mortgages (ARMs), and balloon mortgages.

Mortgage-backed securities (MBS) are products that use pools of mortgages as collateral for the issuance of securities. Although these securities have been collateralized using many types of mortgages, most are collateralized by one- to four-family residential properties. MBS can be broadly classified into four basic categories:

1. mortgage-backed bonds
2. pass-through securities
3. collateralized mortgage obligations and real estate mortgage investment conduits
4. stripped mortgage-backed securities

### Mortgage-Backed Bonds

Mortgage-backed bonds are corporate bonds which are general obligations of the issuer. These bonds are credit enhanced through the pledging of specific mortgages as collateral. Mortgage-backed bonds involve no sale or conveyance of ownership of the mortgages acting as collateral.

### Pass-Through Securities

A mortgage-backed pass-through security provides its owner with a pro rata share in underlying mortgages. The mortgages are typically placed in a trust, and certificates of ownership are sold to investors. Issuers of pass-through instruments primarily act as a conduit for the

investors by collecting and proportionally distributing monthly cash flows generated by homeowners making payments on their home mortgage loans. The pass-through certificate represents a sale of assets to the investor, thus removing the assets from the balance sheet of the issuer.

### Collateralized Mortgage Obligations and Real Estate Mortgage Investment Conduits

Collateralized mortgage obligations (CMOs) and real estate mortgage investment conduit (REMICs) securities represent ownership interests in specified cash flows arising from underlying pools of mortgages or mortgage securities. CMOs and REMICs involve the creation, by the issuer, of a single-purpose entity designed to hold mortgage collateral and funnel payments of principal and interest from borrowers to investors. Unlike pass-through securities, however, which entail a pro rata share of ownership of all underlying mortgage cash flows, CMOs and REMICs convey ownership only of cash flows assigned to specific classes based on established principal distribution rules.

### Stripped Mortgage-Backed Securities

Stripped mortgage-backed securities (SMBS) entail the ownership of either the principal or interest cash flows arising from specified mortgages or mortgage pass-through securities. Rights to the principal are labeled POs (principal only), and rights to the interest cash flows are labeled IOs (interest only).

## CHARACTERISTICS AND FEATURES

### Products Offered under Agency Programs

The Government National Mortgage Association (GNMA or Ginnie Mae), Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac), and the Federal National Mortgage Association (FNMA or Fannie Mae) are the three

main government-related institutions which securitize like groups of mortgages for sale to investors. Major mortgage-purchasing programs sponsored by these three agencies are listed below.

<i>Abbreviation</i>	<i>Description</i>
<i>GNMA</i>	
30-YR	30-year single-family programs
15-YR	15-year single-family programs
GPMs	Graduated-payment programs
PROJ Loans	Project-loan programs
ARMs	Single-family adjustable-rate programs
<i>FNMA</i>	
30-YR SF	30-year single-family programs
30-YR MF	30-year multifamily programs
30-YR FHA/ VA	FHA/VA 30-year single- and multifamily programs
15-YR SF ARMs	15-year single-family programs Single-family adjustable-rate programs
MF ARMs	Multifamily adjustable-rate programs
Balloons	Balloon-payment seven-year programs
Two-step	Five- and seven-year two-step programs
<i>FHLMC</i>	
30-YR	30-year single-family programs
15-YR	15-year single-family programs
TPMs	Tiered-payment single-family programs
ARMs	Single-family adjustable-rate programs
MF	Multifamily programs
5- & 7-year balloons	Balloon-payment, five- to seven-year programs

While the majority of outstanding mortgage loans are structured as 30-year fixed-rate loans, in recent years the size of the 15-year, fixed-rate sector has grown. Declining interest rates and a steep yield curve have led many borrowers to refinance or prepay existing 30-year, higher-coupon loans and replace them with a shorter maturity. This experience also has demonstrated the prepayment risk inherent in all mortgages.

## Public Securities Association Prepayment Rates

Mortgagors have the option to prepay the principal balance of their mortgages at any time. The value of the prepayment option to investors and mortgagors depends on the level of interest rates and the volatility of mortgage prepayments. Prepayment rates depend on many variables, and their response to these variables can be unpredictable. The single biggest influence on prepayment rates is the level of long-term mortgage rates; mortgage prepayments generally increase as long-term rates decrease. While future long-term rates are not known, higher volatility in long-term interest rates means lower rates are more likely, making the prepayment option more valuable to the mortgagor. This higher value of the prepayment option is reflected in lower mortgage security prices, as mortgage investors require higher yields to compensate for increased prepayment risk.

The importance of principal prepayment to the valuation of mortgage securities has resulted in several standardized forms of communicating the rate of prepayments of a mortgage security. One standard form is that developed by the Public Securities Association (PSA). The PSA standard is more accurately viewed as a benchmark or reference for communicating prepayment patterns. It may be helpful to think of the PSA measurement as a kind of speedometer, used only as a unit for measuring the speed of prepayments.

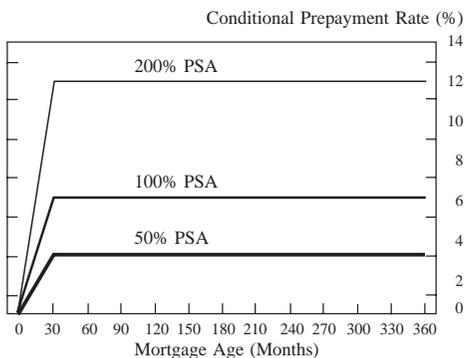
For a pool of mortgage loans, the PSA standard assumes that the mortgage prepayment rate increases at a linear rate over the first 30 months following origination, then levels off at a constant rate for the remaining life of the pool. Under the PSA convention, prepayments are assumed to occur at a 0.2 percent annual rate in the first month, 0.4 percent annual rate in the second month, escalating to a 6.0 percent annual rate by month 30. The PSA's annualized prepayment rate then remains at 6.0 percent over the remaining life of the mortgage pool (see chart 1). Using this convention, mortgage prepayment rates are often communicated in multiples of the PSA standard of 100 percent. For example, 200 percent PSA equals two times the PSA standard, whereas 50 percent PSA equals one-half of the PSA standard.

### *Mortgage Pass-Through Securities*

Mortgage pass-through securities are created when mortgages are pooled together and sold as undivided interests to investors. Usually, the mortgages in the pool have the same loan type and similar maturities and loan interest rates. The originator (for instance, a bank) may continue to service the mortgage and will “pass through” the principal and interest, less a servicing fee, to an agency or private issuer of mortgage-backed securities. Mortgages are then packaged by the agency or private issuer and sold to investors. The principal and interest, less guaranty and other fees are then “passed through” to the investor, who receives a pro rata share of the resulting cash flows.

Every agency pass-through pool is unique, distinguished by features such as size, prepayment characteristics, and geographic concentration or dispersion. Most agency pass-through securities, however, trade on a generic or to-be-announced (TBA) basis. In a TBA trade, the seller and buyer agree to the type of security, coupon, face value, price, and settlement date at the time of the trade, but do not specify the actual pools to be traded. Two days before settlement, the seller identifies the specific pools to be delivered to satisfy the commitment. Trading in agency pass-throughs may take place on any business day, but TBA securities usually settle on one specific date each month. The Public Securities Association releases a monthly schedule that divides all agency pass-throughs into six groups, each settling on a different day. Agency pass-throughs generally clear through electronic book-entry systems.

Chart 1—PSA Model



Nonagency pass-throughs are composed of specific pools and do not trade on a TBA basis. New issues settle on the date provided in the prospectus. In the secondary market, these securities trade on an issue-specific basis and generally settle on a corporate basis (three business days after the trade).

### *Collateralized Mortgage Obligations*

Since 1983, mortgage pass-through securities and mortgages have been securitized as collateralized mortgage obligations (CMOs).<sup>1</sup> While pass-through securities share prepayment risk on a pro rata basis among all bondholders, CMOs redistribute prepayment risk among different classes or tranches. The CMO securitization process recasts prepayment risk into classes or tranches. These tranches have risk profiles ranging from extremely low to significantly high risk. Some tranches can be relatively immune to prepayment risk, while others bear a disproportionate share of the risk associated with the underlying collateral.

CMO issuance has grown dramatically throughout the 1980s and currently dominates the market for FNMA and FHLMC pass-throughs or agency collateral. Given the dramatic growth of the CMO market and its complex risks, this subsection discusses the structures and risks associated with CMOs.

In 1984, the Treasury ruled that multiple-class pass-throughs required active management; this resulted in the pass-through entities' being considered corporations for tax purposes rather than trusts. Consequently, the issuer was no longer considered a grantor trust, and the income was taxed twice: once at the issuer level and again at the investor level. This ruling ultimately had complex and unintended ramifications for the CMO market.

The issue was ultimately addressed in the Tax Reform Act of 1986 through the creation of real estate mortgage investment conduits (REMICs). These instruments are essentially tax-free vehicles for issuing multiple-class mortgage-backed securities. REMIC is a tax designation; a REMIC may be originated as a trust, partnership, or other entity.

1. Today almost all CMOs are structured as real estate mortgage investment conduits (REMICs) to qualify for desirable tax treatment.

The Tax Reform Act of 1986 allowed for a five-year transition during which mortgage-backed securities could be issued pursuant to existing Treasury regulations. However, as of January 1, 1992, REMICs became the sole means of issuing multiple-class mortgage-backed securities exempt from double taxation. As a practical matter, the vast majority of CMOs carry the REMIC designation. Indeed, many market participants use the terms “CMO” and “REMIC” interchangeably.

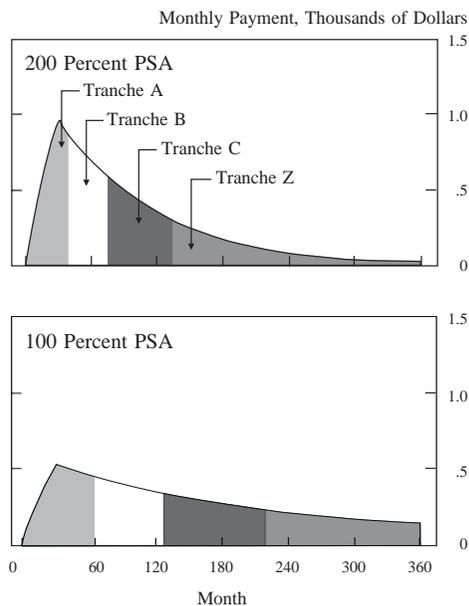
CMOs do not trade on a TBA basis. New-issue CMOs settle on the date provided in the prospectus and trade on a corporate basis (three business days after the trade) in the secondary market. Common CMO structures include sequential pay, PACs, TACs, and floaters and inverse floaters as described below.

*Sequential pay structure.* The initial form of CMO structure was designed to provide more precisely targeted maturities than the pass-through securities. Now considered a relatively simple design for CMOs, the sequential pay structure dominated CMO issuance from 1983 (when the first CMO was created) until the late 1980s. In the typical sequential pay deal of the 1980s (see chart 2), mortgage cash flows were

divided into four tranches, labeled A, B, C, and Z. Tranche A might receive the first 25 percent of principal payments and have an average maturity, or average life, of one to three years.<sup>2</sup> Tranche B, with an average life of between three and seven years, would receive the next 25 percent of principal. Tranche C, receiving the following 25 percent of principal, would have an average life of 5 to 10 years. The Z tranche, receiving the final 25 percent, would be an “accrual” bond with an average life of 15 to 20 years.<sup>3</sup>

The sequential pay structure was the first step in creating a mortgage yield curve, allowing mortgage investors to target short, intermediate, or long maturities. Nevertheless, sequential pay structure maturities remained highly sensitive to prepayment risks, as prepayments of the underlying collateral change the cash flows for each tranche, affecting the longer-dated tranches most, especially the Z tranche. If interest rates declined and prepayment speeds doubled (from 100 percent PSA to 200 percent PSA as shown on chart 2), the average life of the A tranche would change from 35 months to 25 months, but the average life of the Z bond would shift from 280 months to 180 months. Hence, the change in the value of the Z bond would be similarly greater than the price change of the A tranche.

Chart 2—Four-Tranche Sequential Pay CMO



*Planned amortization class (PAC) structure.* The PAC structure, which now dominates CMO issuance, creates tranches, called planned amortization classes, with cash flows that are protected from prepayment changes within certain limits. However, creating this “safer” set of tranches necessarily means that there must be other tranches, called “support” bonds, that are by definition more volatile than the underlying pass-throughs. While the PAC tranches are relatively easy to sell, finding investors for higher-yielding, less predictable support bonds has been crucial for the success of the expanding CMO market.

Chart 3 illustrates how PACs are created. In the example, the estimated prepayment rate for the mortgages is 145 percent of the PSA standard, and the desired PAC is structured to

2. Average life, or weighted average life (WAL), is defined as the weighted average number of years that each principal dollar of the mortgage security remains outstanding.

3. Unlike the Z tranche, the A, B, and C tranches receive regular interest payments in the early years before the principal is paid off.

be protected if prepayments slow to 80 percent PSA or rise to 250 percent PSA. The PACs therefore have some protection against both “extension risk” (slower than expected prepayments) and “call risk” (faster than expected prepayments). In order to create this 80 to 250 percent “PAC range,” principal payments are calculated for 80 percent PSA and 250 percent PSA.

The area underneath both curves indicates that amount of estimated principal that can be used to create the desired PAC tranche or tranches. That is, as long as the prepayment rates are greater than 80 percent PSA or less than 250 percent PSA, the four PACs will receive their scheduled cash flows (represented by the shaded areas).

This PAC analysis assumes a constant prepayment rate of between 80 and 250 percent of the PSA standard over the life of the underlying mortgages. Since PSA speeds can change every month, this assumption of a constant PSA speed for months 1 to 360 is never realized. If prepayment speeds are volatile, even within the PAC range, the PAC range itself may narrow over time. This phenomenon, termed “effective PAC band,” affects longer-dated PACs more than short-maturity PACs. Thus, PAC prepayment

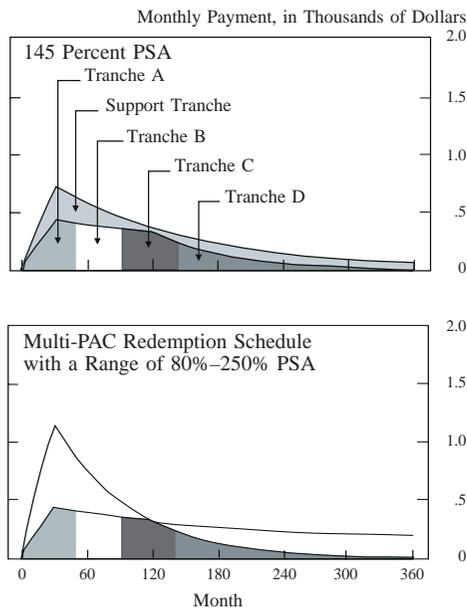
protection can break down from extremely high, extremely low, or extremely volatile prepayment rates.

A PAC bond classified as PAC 1 in a CMO structure has the highest cash-flow priority and the best protection from both extension and prepayment risk. In the past, deals have also included super PACs, another high-protection, lower-risk-type tranche distinguished by extremely wide bands. The mechanisms that protect a PAC tranche within a deal may diminish, and its status may shift more toward the support end of the spectrum. The extent of a support-type role that a PAC might play depends in part on its original cash-flow priority status and the principal balances of the other support tranches embedded within the deal. Indeed, as prepayments accelerated in 1993, support tranches were asked to bear the brunt, and many disappeared. A PAC III, for example, became a pure support tranche, foregoing any PAC-like characteristics in that case.

A variation on the PAC theme has emerged in the scheduled tranche (SCH). Like a PAC, an SCH has a predetermined cash-flow collar, but it is too narrow even to be called a PAC III. An SCH tranche is also prioritized within a deal using the above format, but understand that its initial priority status is usually below even that of a PAC III. These narrower band PAC-type bonds were designed to perform well in low-volatility environments and were popular in late 1992 and early 1993. At that time, many investors failed to realize what would happen to the tranche when prepayments violated the band.

In chart 3, the four grey shaded areas represent the PAC structure, which has been divided into four tranches to provide investors with an instrument more akin to the bullet maturity of Treasury and corporate bonds.<sup>4</sup> The two support tranches are structured to absorb the full amount of prepayment risk to the extent the prepayment rate for the PAC tranches is within the specified range of 80 to 250 percent PSA. The second panel of chart 3 shows principal cash flows at the original estimated speed of 145 percent PSA, which are divided between the PAC and support bonds throughout the life of the underlying mortgages.

Chart 3—Principal Payments

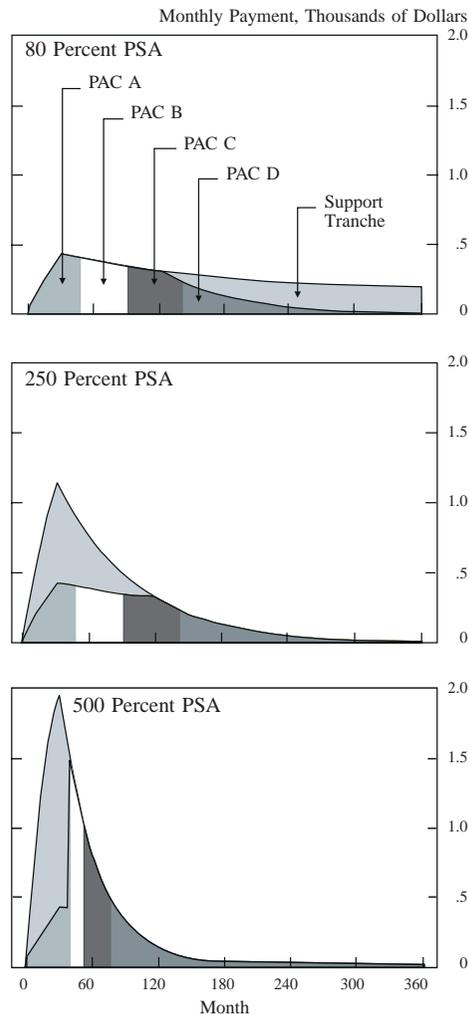


4. Treasury and corporate bonds usually return principal to investors at stated maturity; the PAC structure narrows the time interval over which principal is returned to the investors.

Chart 4 shows how both PACs and the support tranches react to different prepayment speeds. The average lives of the support bonds in this example could fluctuate from 1½ to 25 years depending on prepayment speeds. Simply put, support-bond returns are diminished whether prepayment rates increase or decrease (a lose-lose proposition). To compensate holders of support bonds for this characteristic (sometimes referred to as “negative convexity”), support bonds carry substantially higher yields

than PAC bonds.<sup>5</sup> Conversely, PAC bond investors are willing to give up yield in order to reduce their exposure to prepayment risk or negative convexity. Nevertheless, PAC bond holders are exposed to prepayment risk outside the protected range and correspondingly receive yields above those available on comparable Treasury securities. In extreme cases, even PAC tranches are subject to prepayment risk. For example, at 500 percent PSA (see the third panel of chart 4), the PAC range is broken. The support bonds fail to fully protect even the first PAC tranche; principal repayment accelerates sharply at the end of the scheduled maturity of PAC A.

Chart 4—Principal Payments



*Targeted amortization tranche structure.* A targeted amortization tranche (TAC) typically offers protection from prepayment risk but not extension risk. Similar to the cash-flow schedule of a PAC that is built around a collar, a TAC's schedule is built around a single pricing speed, and the average life of the tranche is “targeted” to that speed. Any excess principal paid typically has little effect on the TAC; its targeted speed acts as a line of defense. Investors in TACs, however, pay the price for this defense with their lack of protection when rates increase, subjecting the tranche to potential extension risk.

*Floater and inverse floater.* CMOs and REMICs can include several floating-rate classes. Floating-rate tranches have coupon rates that float with movements in an underlying index. The most widely used indexes for floating-rate tranches are the London Interbank Offered Rate (LIBOR) and the Eleventh District Cost of Funds Index (COFI). While LIBOR correlates closely with interest-rate movements in the domestic federal funds market, COFI has a built-in lag feature and is slower to respond to changes in interest rates. Thus, the holders of COFI-indexed floaters generally experience a delay in the effects of changing interest-rate movements.

5. Price/yield curves for most fixed-income securities have a slightly convex shape, hence the securities are said to possess convexity. An important and desirable attribute of the convex shape of the price/yield curve for Treasury securities is that prices rise at a faster rate than they decline. Mortgage price/yield curves tend to be concave, especially in the range of premium prices, and are said to possess negative convexity. Securities with negative convexity rise in price at a slower rate than they fall in price.

Since most floating-rate tranches are backed by fixed-rate mortgages or pass-through securities, floating-rate tranches must be issued in combination with some kind of “support.” The designed support mechanism on floaters is an interest-rate cap, generally coupled with a support bond or inverse floater. If interest rates rise, where does the extra money come from to pay higher rates on the floating CMO tranches? The solution is in the form of an inverse floating-rate tranche. The coupon rate on the inverse tranche moves opposite of the accompanying floater tranche, thus allowing the floater to pay high interest rates. The floater and the inverse tranches “share” interest payments from a pool of fixed-rate mortgage securities. If rates rise, the coupon on the floater moves up; the floater takes more of the shared interest, leaving less for the inverse, whose coupon rate must fall. If rates fall, the rate on the floater falls, and more money is available to pay the inverse floater investor and the corresponding rate on the inverse rises.

Effectively, the interest-payment characteristics of the underlying home mortgages have not changed; another tranche is created where risk is shifted. This shifting of risk from the floater doubles up the interest-rate risk in the inverse floater, with enhanced yield and price ramifications as rates fluctuate. If rates fall, the inverse floater receives the benefit of a higher-rate-bearing security in a low-rate environment. Conversely, if rates rise, that same investor pays the price of holding a lower-rate security in a high-rate environment. As with other tranche types, prepayments determine the floating cash flows and the weighted average life of the instrument (WAL).

With respect to floaters, the two most important risks are the risk that the coupon rate will adjust to its maximum level (cap risk) and the risk that the index will not correlate tightly with the underlying mortgage product. Additionally, floaters that have “capped out” and that have WALs that extend as prepayments slow may experience considerable price depreciation.

### *Stripped Mortgage-Backed Securities: Interest-Only and Principal-Only*

Interest-only (IO) and principal-only (PO) securities are another modification of the mortgage pass-through product. This market is referred to as the stripped mortgage-backed securities (SMBS) market. Both IOs and POs are more

sensitive to prepayment rates than the underlying pass-throughs.<sup>6</sup> Despite the increased exposure to prepayment risk, these instruments have proved popular with several groups of investors. For example, mortgage servicers may purchase POs to offset the loss of servicing income from rising prepayments. IOs are often used as a hedging vehicle by fixed-income portfolio managers because the value of IOs rises when prepayments slow—usually in rising interest-rate environments when most fixed-income security prices decline.

Two techniques have been used to create IOs and POs. The first, which dominates outstandings in IOs and POs, strips pass-throughs into their interest and principal components, which are then sold as separate securities. As of October 1993, approximately \$65 billion of the supply of outstanding pass-throughs had been stripped into IOs and POs.<sup>7</sup> The second technique, which has become increasingly popular over the past few years, simply slices off an interest or principal portion of any CMO tranche to be sold independently. In practice, IO slices, called “IOettes,”<sup>8</sup> far outnumber PO slices.

Since IOs and IOettes produce cash flows in proportion to the mortgage principal outstanding, IO investors are hurt by fast prepayments and aided by slower prepayments. The value of POs rises when prepayments quicken and falls when prepayments slow because of the increases in principal cash flows coupled with the deep discount price of the PO.

IOs and IOettes are relatively high-yielding tranches that are generally subject to considerable prepayment volatility. For example, falling interest rates and rising prepayment speeds in late 1991 caused some IOs (such as those backed by FNMA 10 percent collateral) to fall up to 40 percent in value between July and December. IOs also declined sharply on several occasions in 1992 and 1993 as mortgage rates moved to 20- and 25-year lows, resulting in very high levels of prepayment. CMO dealers use IOettes to reduce coupons on numerous tranches, allowing these tranches to be sold at a discount

6. This counterintuitive result arises because IO and PO prices are negatively correlated.

7. Of this amount, FNMA has issued \$26 billion, FHLMC \$2.3 billion, and private issuers \$6.5 billion.

8. Securities and Exchange Commission regulations forbid pure IO slices within CMOs. IO slices therefore include nominal amounts of principal and are termed “IOettes.” As a practical matter, IOettes have the price performance characteristics of IOs.

(as preferred by investors). In effect, much of the call risk is transferred from these tranches to the IOette.

The fact that IO prices generally move inversely to most fixed-income securities makes them theoretically attractive hedging vehicles in a portfolio context. Nevertheless, IOs represent one of the riskiest fixed-income assets available and may be used in a highly leveraged way to speculate about either future interest rates or prepayment rates. Given that their value rises (falls) when interest rates increase (decrease), many financial institutions, including banks, thrifts, and insurance companies, have purchased IOs and IOettes as hedges for their fixed-income portfolios, but such hedges might prove problematic as they expose the hedger to considerable basis risk.

## USES

Both pass-through securities and CMOs are purchased by a broad array of institutional customers, including banks, thrifts, insurance companies, pension funds, mortgage “boutiques,”<sup>9</sup> and retail investors. CMO underwriters customize the majority of CMO tranches for specific end-users, and customization is especially common for low-risk tranches. Since this customization results from investors’ desire to either hedge an existing exposure or to assume a specific risk, many end-users perceive less need for hedging. For the most part, end-users generally adopt a buy-and-hold strategy, perhaps in part because the customization makes resale more difficult.

### Uses by Banks

Within the mortgage securities market, banks are predominately investors or end-users rather than underwriters or market makers. Furthermore, banks tend to invest in short to intermediate maturities. Indeed, banks aggressively purchase short-dated CMO tranches, such as planned amortization classes, floating-rate tranches, and adjustable-rate mortgage securities.

<sup>9</sup> Mortgage boutiques are highly specialized investment firms which typically invest in residuals and other high-risk tranches.

To the extent that banks do operate as market makers, the risks are more diverse and challenging. The key areas of focus for market makers are risk-management practices associated with trading, hedging, and funding their inventories. The operations and analytic support staff required for a bank’s underwriting operation are much greater than those needed for its more traditional role of investor.

Regulatory restrictions limit banks’ ownership of high-risk tranches. These tranches are so complex that the most common approaches and techniques for hedging interest-rate risks could be ineffective. High-risk tranches are so elaborately structured and highly volatile that it is unlikely that a reliable hedge offset exists. Hedging these instruments is largely subjective, and assessing hedge effectiveness becomes extremely difficult. Examiners must carefully assess whether owning such high-risk tranches reduces a bank’s overall interest-rate risk.

## DESCRIPTION OF MARKETPLACE

### Primary Market

The original lender is called the mortgage originator. Mortgage originators include commercial banks, thrifts, and mortgage bankers. Originators generate income in several ways. First, they typically charge an origination fee, which is expressed in terms of basis points of the loan amount. The second source of revenue is the profit that might be generated from selling a mortgage in the secondary market, and the profit is called secondary-marketing profit. The mortgage originator may also hold the mortgage in its investment portfolio.

### Secondary Market

The process of creating mortgage securities starts with mortgage originators which offer consumers many different types of mortgage loans. Mortgages that meet certain well-defined criteria are sold by mortgage originators to conduits, which link originators and investors. These conduits will pool like groups of mortgages and either securitize the mortgages and sell them to an investor or retain the mortgages as investments in their own portfolios. Both

government-related and private institutions act in this capacity. Ginnie Mae, Freddie Mac, and Fannie Mae are the three main government-related conduit institutions; all of them purchase *conforming* mortgages which meet the underwriting standards established by the agencies for being in a pool of mortgages underlying a security that they guarantee.

Ginnie Mae is a government agency, and the securities it guarantees carry the full faith and credit of the U.S. government. Fannie Mae and Freddie Mac are government-sponsored agencies; securities issued by these institutions are guaranteed by the agencies themselves and are generally assigned an AAA credit rating partly due to the implicit government guarantee.

Mortgage-backed securities have also been issued by private entities such as commercial banks, thrifts, homebuilders, and private conduits. These issues are often referred to as private label securities. These securities are not guaranteed by a government agency or GSE. Instead, their credit is usually enhanced by pool insurance, letters of credit, guarantees, or over-collateralization. These securities usually receive a rating of AA or better.

Private issuers of pass-throughs and CMOs provide a secondary market for conventional loans which do not qualify for Freddie Mac and Fannie Mae programs. There are several reasons why conventional loans may not qualify, but the major reason is that the principal balance exceeds the maximum allowed by the government (these are called “jumbo” loans in the market).

Servicers of mortgages include banks, thrifts, and mortgage bankers. If a mortgage is sold to a conduit, it can be sold in total, or servicing rights may be maintained. The major source of income related to servicing is derived from the servicing fee. This fee is a fixed percentage of the outstanding mortgage balance. Consequently, if the mortgage is prepaid, the servicing fee will no longer accrue to the servicer. Other sources of revenue include interest on escrow, float earned on the monthly payment, and late fees. Also, servicers who are lenders often use their portfolios of borrowers as potential sources to cross-sell other bank products.

## PRICING

Mortgage valuations are highly subjective because of the unpredictable nature of mortgage

prepayment rates. Despite the application of highly sophisticated interest-rate simulation techniques, results from diverse proprietary prepayment models and assumptions about future interest-rate volatility still drive valuations. The subjective nature of mortgage valuations makes marking to market difficult due to the dynamic nature of prepayment rates, especially as one moves farther out along the price-risk continuum toward high-risk tranches. Historical price information for various CMO tranche types is not widely available and, moreover, might have limited value given the generally different methodologies used in deriving mortgage valuation.

## Decomposition of MBS

A popular approach to analyzing and valuing a callable bond involves breaking it down into its component parts—a long position in a noncallable bond and a short position in a call option written to the issuer by the investor. An MBS investor owns a callable bond, but decomposing it is not as easy as breaking down more traditional callables. The MBS investor has written a series of put and call options to each homeowner or mortgagor. The analytical challenge facing an examiner is to determine the value and risk profile of these options and their contribution to the overall risk profile of the portfolio. Compounding the problem is the fact that mortgagors do not exercise these prepayment options at the same time when presented with identical situations. Most prepayment options are exercised at the least opportune time from the standpoint of the MBS investor. In a falling-rate environment, a homeowner will have a greater propensity to refinance (or exercise the option) as prevailing mortgage rates fall below the homeowner's original note (as the option moves deeper into the money). Under this scenario, the MBS investor receives a cash windfall (principal payment) which must be reinvested in a lower-rate environment. Conversely, in a high- or rising-rate environment, when the prevailing mortgage rate is higher than the mortgagor's original term rate, the homeowner is less apt to exercise the option to refinance. Of course, the MBS investor would like nothing more than to receive his or her principal and be able to reinvest that principal at the prevailing higher rates. Under this scenario, the MBS investor holds an instrument

with a stated coupon that is below prevailing market rates and relatively unattractive to potential buyers.

Market prices of mortgages reflect an expected rate of prepayments. If prepayments are faster than the expected rate, the mortgage security is exposed to call risk. If prepayments are slower than expected, the mortgage securities are exposed to extension risk (similar to having written a put option). Thus, in practice, mortgage security ownership is comparable to owning a portfolio of cash bonds and writing a combination of put and call options on that portfolio of bonds. Call risk is manifested in a shortening of the bond's effective maturity or duration, and extension risk manifests itself in the lengthening of the bond's effective maturity or duration.

## Option-Adjusted Spread Analysis

For a further discussion of option-adjusted spread (OAS) analysis or optionality in general, see section 4330.1, "Options."

## HEDGING

Hedging mortgage-backed securities ultimately comes down to an assessment of one's expectation of forward rates (an implied forward curve). A forward-rate expectation can be thought of as a no-arbitrage perspective on the market, serving as a pricing mechanism for fixed-income securities and derivatives, including MBS. Investors who wish to hedge their forward-rate expectations can employ strategies which involve purchasing the underlying security and the use of swaps, options, futures, caps, or combinations thereof to hedge duration and convexity risk.<sup>10</sup>

With respect to intra-portfolio techniques, one can employ IOs and POs as hedge vehicles. Although exercise of the prepayment option generally takes value away from the IO class and adds value to the PO class, IOs and POs derived from the same pool of underlying mortgages *do not* have a correlation coefficient of

negative one.<sup>11</sup> If that were the case, the value of a pass-through security would *always* be hedged with respect to interest rates. However, IOs and POs do represent extremities in MBS theory and, properly applied, can be used as effective risk-reduction tools. Because the value of the prepayment option and the duration of an IO and PO are not constant, hedges must be continually managed and adjusted.

In general, a decline in prepayment speeds arises largely from rising mortgage rates, with fixed-rate mortgage securities losing value. At the same time, IO securities are rising in yield and price. Thus, within the context of an overall portfolio, the inclusion of IOs serves to increase yields and reduce losses in a rising-rate environment. More specifically, IOs can be used to hedge the interest-rate risk of Treasury strip securities. As rates increase, an IO's value increases. The duration of zero-coupon strips equals their maturity, while IOs have a negative duration.<sup>12</sup> Combining IOs with strips creates a portfolio with a lower duration than a position in strips alone.<sup>13</sup>

POs are a means to synthetically add discount (and positive convexity) to a portfolio, allowing it to more fully participate in bull markets. For example, a bank funding MBS with certificates of deposit (CDs) is exposed to prepayment risk. If rates fall faster than expected, mortgage holders (in general) will exercise their prepayment option while depositors will hold their higher-than-market CDs as long as possible. The bank could purchase POs as a hedge against its exposure to prepayment and interest-rate risk. As a hedging vehicle, POs offer preferable alternatives to traditional futures or options; the performance of a PO is directly tied to actual prepayments, thus the hedge should experience potentially less basis risk than other cross-market hedging instruments.

## RISKS

### Prepayment Risk

All investors in the mortgage sector share a common concern: the mortgage prepayment

10. Davidson, Andrew S., and Michael D. Herskovitz. *Mortgage Backed Securities—Investment Analysis and Advanced Valuation Techniques*. Chicago: Probus Publishing, 1994.

11. Zissu, Anne, and Charles Austin Stone. "The Risks of MBS and Their Derivatives." *Journal of Applied Corporate Finance*, Fall 1994.

12. *Ibid.*, p. 102.

13. *Ibid.*, p. 104.

option. This option is the homeowner's right to prepay a mortgage any time, at par. The prepayment option makes mortgage securities different from other fixed-income securities, as the timing of mortgage principal repayments is uncertain. The cash-flow uncertainty that derives from prepayment risk means that the maturity and duration of a mortgage security are uncertain. For investors, the prepayment option creates an exposure similar to that of having written a call option. That is, if mortgage rates move lower, causing mortgage bond prices to move higher, the mortgagor has the right to call the mortgage away from the investor at par.

While lower mortgage interest rates are the dominant economic incentive for prepayment, idiosyncratic, noneconomic factors to prepay a mortgage further complicate the forecasting of prepayment rates. These factors are sometimes summarized as the "five D's": death, divorce, destruction, default, and departure (relocation). Prepayments arising from these causes may lead to a mortgage's being called away from the investor at par when it is worth more or less than par (that is, trading at a premium or discount).

### Funding and Reinvestment Risk

The uncertainty of the maturities of underlying mortgages also presents both funding and reinvestment risks for investors. The uncertainty of a mortgage security's duration makes it difficult to obtain liabilities for matched funding of these assets. This asset/liability gap presents itself whether the mortgage asset's life shortens or lengthens, and it may vary dramatically.

Reinvestment risk is normally associated with duration shortening or call risk. Investors receive principal earlier than anticipated, usually as a result of declines in mortgage interest rates; the funds can then be reinvested only at the new lower rates. Reinvestment risk is also the opportunity cost associated with lengthening durations. Mortgage asset durations typically extend as rates rise. This results in lower investor returns as they are unable to reinvest at the now higher rates.

### Credit Risk

While prepayments expose pass-throughs and CMOs to considerable price risk, most MBS

pass-throughs have little credit risk.<sup>14</sup> Approximately 90 percent of all outstanding pass-through securities have been guaranteed by Ginnie Mae, Fannie Mae, and Freddie Mac.<sup>15</sup> This credit guarantee gives "agency" pass-through securities and CMOs a decisive advantage over nonagency pass-throughs and CMOs, which comprise less than 10 percent of the market.

In general, nonagency pass-through securities and CMOs use mortgages that are ineligible for agency guarantees. Issuers can also obtain credit enhancements, such as senior subordinated structures, insurance, corporate guarantees, or letters of credit from insurance companies or banks. The rating of the nonagency issue then partially depends upon the rating of the insurer and its credit enhancement.

### Settlement and Operational Risk

The most noteworthy risk issues associated with the trading of pass-through securities is the forward settlement and operational risk associated with the allocation of pass-through trades. Most pass-through trading occurs on a forward basis of two to three months, often referred to as "TBA" or "to be announced" trading.<sup>16</sup> During this interval, participants are exposed to counterparty credit risk.

Operating risk grows out of the pass-through seller's allocation option that occurs at settlement. Sellers in the TBA market are allowed a 2.0 percent delivery option variance when meeting their forward commitments. That is, between 98 and 102 percent of the committed par amount may be delivered. This variance is provided to ease the operational burden of recombining various pool sizes into round trading lots.<sup>17</sup> This delivery convention requires significant operational expertise and, if mismanaged, can be a

14. Credit risk in a pass-through stems from the possibility that the homeowner will default on the mortgage *and* that the foreclosure proceeds from the resale of the property will fall short of the balance of the mortgage.

15. For a full explanation of the minor differences between these agencies, see chapter 5 in Fabozzi, *The Handbook of Mortgage-Backed Securities*, 1995.

16. In the forward mortgage pass-through trading, or TBA trading, the seller announces the exact pool mix to be delivered the second business day before settlement day.

17. "Good delivery" guidelines are promulgated by the Public Securities Association in its *Uniform Practices* publication.

source of significant risk in the form of failed settlements and unforeseen carrying costs.

## Price Volatility in High-Risk CMOs

When the cash flow from pass-through securities is allocated among CMO tranches, prepayment risk is concentrated within a few volatile classes, most notably residuals, inverse floaters, IOs and POs, Z bonds, and long-term support bonds. These tranches are subject to sharp price fluctuations in response to changes in short- and long-term interest rates, interest-rate volatility, prepayment rates, and other macroeconomic conditions. Some of these tranches—especially residuals and inverse floaters—are frequently placed with a targeted set of investors willing to accept the extra risk. These classes are also among the most illiquid bonds traded in the CMO market.

These high-risk tranches, whether held by dealers or investors, have the potential to incur sizable losses (and sometimes gains) within a short period of time.<sup>18</sup> Compounding this price risk is the difficulty of finding effective hedging strategies for these instruments. Using different CMOs to hedge each other can present problems. Although pass-through securities from different pools tend to move in the same direction based on the same event, the magnitude of these moves can vary considerably, especially if the underlying mortgage pools have different average coupons.<sup>19</sup>

## Risks in “Safe” Tranches

Investors may also be underestimating risks in some “safe” tranches, such as long-maturity PACs, PAC 2s, and 3s, and floaters, because these tranches can experience abrupt changes in their average lives once their prepayment ranges

are exceeded. Even floating-rate tranches face risks, especially when short-term rates rise significantly and floaters reach their interest-rate caps. At the same time, long rates may rise and prepayments slow, causing the floaters’ maturities to extend significantly since the floater is usually based on a support bond. Under such circumstances, floater investors could face significant losses.

In addition to possible loss of market value, these safe tranches may lose significant liquidity under extreme interest-rate movements. These tranches are currently among the most liquid CMOs. Investors who rely on this liquidity when interest-rate volatility is low may find it difficult to sell these instruments to raise cash in times of financial stress. Nevertheless, investors in these tranches face lower prepayment risk than investors in either mortgage pass-throughs or the underlying mortgages themselves.

## Cap Risk

The caps in many floating-rate CMOs and ARMs are an embedded option. The value of floating-rate CMOs or ARMs is equal to the value of an uncapped floating-rate security less the value of the cap. As the coupon rate of the security approaches the cap rate, the value of the option increases and the value of the security falls. The rate of change is non-linear and increases as the coupon approaches the cap. As the coupon rate equals or exceeds the cap rate, the security will exhibit characteristics similar to those of a fixed-rate security, and price volatility will increase. All else being equal, securities with coupon rates close to their cap rates will tend to exhibit greater price volatility than securities with coupon rates farther away from their cap rates. Also, the tighter the “band” of caps and floors on the periodic caps embedded in ARMs, the greater the price sensitivity of the security will be. The value of embedded caps also increases with an increase in volatility. Thus, all else being equal, higher levels of interest-rate volatility will reduce the value of the floating-rate CMO or ARM.

## FFIEC Regulations Concerning Unsuitable Investments

The Federal Financial Institutions Examination Council (FFIEC) issued a revised policy state-

18. Examples of single-firm losses include a \$300 million to \$400 million loss by one firm on POs in the spring of 1987; more recently, several firms have lost between \$50 million and \$200 million on IO positions in 1992 and 1993.

19. For a discussion of the idiosyncratic prepayment behavior of pass-throughs, see Sean Beckett and Charles S. Morris, *The Prepayment Experience of FNMA Mortgage-Backed Securities*. New York University Salomon Center, 1990, pp. 24–41.

ment concerning securities activities for member banks. These rules became effective February 10, 1992, for member banks and bank holding companies under the Board's jurisdiction. A bank's CMO investments are deemed unsuitable if—

- the present weighted average life (WAL) is greater than 10 years,
- the WAL extends more than four years or shortens more than six years for a parallel interest-rate shift of up and down 300 basis points, or
- the price changes by more than 17 percent from the asking price for a parallel interest-rate shift of up and down 300 basis points.

An affirmation of any of these three parameters means that the bond in question (1) may be considered high risk and (2) may not be a suitable investment for banks or bank holding companies. An institution holding high-risk securities must demonstrate that they reduce overall interest-rate risk for the bank.

Floating-rate CMOs with coupons tied to indexes other than LIBOR (sometimes called *mismatched floaters*) are generally exempt from the average-life and average-life sensitivity tests. Given the degree of price sensitivity associated with these securities, however, institutions that purchase non-LIBOR-indexed floaters must maintain documentation showing that they understand and are able to monitor the risks of these instruments. The documentation should include a prepurchase analysis and at least an annual analysis of the price sensitivity of the security under both parallel and nonparallel shifts of the yield curve. See the *Commercial Bank Examination Manual* for more information on the FFIEC testing parameters detailed above.

## ACCOUNTING TREATMENT

### Buyer

The accounting treatment for investments in MBS is determined by SFAS 115, "Accounting for Certain Investments in Debt and Equity Securities," as amended by SFAS 125, "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." See section 2120.1, "Accounting," for further discussion.

For call report purposes, any high-risk mortgage-backed security (as defined by the Supervisory Policy Statement on Securities Activities of January 10, 1992) purchased by depository institutions after February 10, 1992, must be carried in the institution's trading account or as an asset available-for-sale. On the other hand, mortgage-backed securities that do not meet the definition of a high-risk mortgage security at the time of purchase should be designated as held-to-maturity, available-for-sale, or trading assets, as appropriate. Institutions must ascertain at least annually that these products remain outside the high-risk category.

### Seller

SFAS 125 covers the accounting treatment for the securitization of receivables and is effective for securitizations occurring after December 31, 1996. Before the implementation of SFAS 125, securitization transactions were accounted for in accordance with SFAS 77, "Reporting by Transferees for Transfers of Receivables with Recourse."

SFAS 125 focuses on control and takes a "financial components approach." The standard requires that an entity surrender control in order to "derecognize" the assets, or take the assets off its balance sheet. Under SFAS 125, control is considered to be surrendered and, therefore, a transfer is considered a sale if all of the following conditions are met:

- The transferred assets have been put beyond the reach of the transferor, even in bankruptcy.
- Either (1) the transferee has the right to pledge or exchange the transferred assets or (2) the transferee is a qualifying special-purpose entity, and the holder of beneficial interests in that entity has the right to pledge or exchange the transferred assets.
- The transferor does not maintain control over the transferred assets through (1) an agreement that entitles and obligates the transferor to repurchase or redeem them before their maturity or (2) an agreement that entitles the transferor to repurchase or redeem transferred assets that are not readily obtainable.

The financial components approach recognizes that complex transactions, such as securitizations, often involve a variety of components.

SFAS 125 requires that entities recognize obligations or derivatives incurred or obtained at fair value, while assets retained or sold should be valued by allocation of the previous carrying amount based on their relative fair values.

## RISK-BASED CAPITAL WEIGHTING

Pass-through securities are assigned the following weights:

GNMA	0
FNMA and FHLMC	20 percent
Private label	50–100 percent

Collateralized mortgage obligations are assigned the following weights:

Backed by Ginnie Mae, Fannie Mae, or Freddie Mac securities	20–100 percent
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Backed by whole loans or private label pass-throughs	50–100 percent
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Stripped MBS are assigned a 100 percent risk weighting.

## LEGAL LIMITATIONS FOR BANK INVESTMENTS

### Pass-Through Securities

Ginnie Mae, Fannie Mae, and Freddie Mac pass-through securities are type I securities. Banks can deal in, underwrite, purchase, and sell these securities for their own accounts without limitation.

### CMOs and Stripped MBS

CMOs and stripped MBS securitized by small business-related securities and certain residential- and commercial-related securities rated Aaa and Aa are type IV securities. As such, a bank may purchase and sell these securities for its own

account without limitation. CMOs and stripped MBS securitized by small business-related securities rated A or Baa are also type IV securities and are subject to an investment limitation of 25 percent of a bank's capital and surplus. Banks may deal in type IV securities which are fully secured by type I transactions without limitations.

CMOs and stripped MBS securitized by certain residential- and commercial-mortgage-related securities rated A or Baa are type V securities. For type V securities, the aggregate par value of a bank's purchase and sales of the securities of any one obligor may not exceed 25 percent of its capital and surplus.

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- Zissu, Anne, and Charles Austin Stone. "The Risks of MBS and Their Derivatives." *Journal of Applied Corporate Finance*. Fall 1994 Secondary Market for CMOs.

### GENERAL DESCRIPTION

The Australian Treasury issues Australian Commonwealth Government Bonds (CGBs) to finance the government's budget deficit and to refinance maturing debt. Since 1982, bonds have been issued in registered form only, although some outstanding issues may be in bearer form. The principal and interest on CGBs are guaranteed by the Commonwealth Government of Australia.

### CHARACTERISTICS AND FEATURES

CGBs, with maturities ranging from one to 20 years, are issued every six to eight weeks in an average tender size totaling A\$800 million. Most CGBs are noncallable, fixed-coupon securities with bullet maturities. The Australian Treasury has issued some indexed-linked bonds with either interest payments or capital linked to the Australian Consumer Price Index. However, there are few of these issues and they tend to be very illiquid. CGBs can be issued with current market coupons, but in many cases the Treasury will reopen existing issues.

Interest for government bonds is paid semi-annually on the 15th day of the month, and it is calculated on an actual/365-day-count basis. Coupon payments that fall on weekends or public holidays are paid on the next business day. Semiannual coupon payments are precisely half the coupon rate. Bonds that have more than six months left to maturity settle three business days after the trade date (T+3); bonds with less than six months left to maturity may settle on the same day, provided they are dealt before noon; otherwise, they settle the next day.

### USES

Australian banks are the largest single group of investors in outstanding CGB issues; they use these securities to meet regulatory capital requirements. The Australian pension industry holds CGBs mainly as investment vehicles. In addition, CGBs are viewed as attractive investment vehicles by many foreign investors

because (1) they offer high yields relative to those available on other sovereign debt instruments and (2) the Australian bond market is regarded as stable. Although the bond market has a substantial foreign participation, due to its attractive yield and a much shorter period of time required for the bonds to mature, the majority of CGB investors are domestic. U.S. banks purchase CGBs to diversify their portfolios, speculate on currency and Australian interest rates, and to hedge Australian-denominated currency positions and positions along the Australian yield curve.

### DESCRIPTION OF MARKETPLACE

#### Issuing Practices

CGBs are issued periodically on an "as-needed" basis, typically every six to eight weeks. Generally, issuance is through a competitive tender whereby subscribers are invited to submit bids as they would in an auction. Issue size is announced one day before the tender day. Bids, which are sent to the Reserve Bank of Australia through the Reserve Bank Information Transfer System (RBITS), are submitted to the Reserve Bank of Australia on a semiannual, yield-to-maturity basis. Specific information on the issue is announced later on the tender day, such as the amounts tendered and issued, the average and range of accepted bids, and the percentage of bids allotted at the highest yield.

#### Secondary Market

While CGBs are listed on the Australian Stock Exchange, nearly all trading takes place over the counter (OTC), by screen or direct trading. The primary participants in the secondary market are authorized dealers and share brokers. OTC transactions must be in amounts of A\$250,000 or more. Stock exchange transactions are essentially limited to retail transactions under A\$1 million. Usually, authorized dealers trade bonds which are within five years of maturing.

## Market Participants

### *Sell Side*

Authorized dealers are the primary participants in the sell side of the CGB market.

### *Buy Side*

Australian banks and other financial institutions are the largest single group of investors in CGBs. These entities usually hold large quantities of shorter-term government bonds for regulatory purposes, as these securities may be included in the prime asset ratios of banks. In addition, a variety of other domestic investors participate in the CGB market.

The Australian bond market has been known to attract substantial foreign participation over the years, primarily because it is regarded as a stable market which offers relatively high yields. In general, foreign market participants are institutional investors, such as securities firms, life insurance companies, banks, and fund managers.

## Market Transparency

Prices tend to be active and liquid. Price transparency is enhanced by the dissemination of prices by several information vendors including Reuters and Telerate.

## PRICING

CGBs are quoted in terms of yield and rounded to three decimal places to determine gross price for settlement purposes. While tick size is equivalent to one basis point, yields are often quoted to the half basis point.

## HEDGING

Interest-rate risk may be hedged by taking an offsetting position in other government bonds or by using interest-rate forward, futures, options, or swap contracts. Foreign-exchange risk may be hedged by using foreign-currency derivatives and swaps.

## RISKS

### Liquidity Risk

The CGB market is considered fairly active and liquid. Trading volume among the benchmark bonds is about equal, although the 3-year and 10-year benchmark issues tend to have the most turnover.

### Interest-Rate Risk

CGBs are subject to price fluctuation resulting from interest-rate volatility. Generally, longer-term bonds have more price volatility than shorter-term instruments. If an institution has a large concentration of long-term maturities, it may be subject to unwarranted interest-rate risk.

### Foreign-Exchange Risk

Currency fluctuations may affect the bond's yield as well as the value of coupons and principal paid in U.S. dollars. A number of factors may influence a country's foreign-exchange rate, including its balance of payments and prospective changes in that balance; inflation and interest-rate differentials between that country and the United States; the social and political environment, particularly with regard to the impact on foreign investment; and central bank intervention in the currency markets.

### Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

## ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by SFAS 115, "Accounting for Certain Investments in Debt and Equity Securities," as amended by SFAS 125, "Accounting for Transfers and Servicing of

Financial Assets and Extinguishments of Liabilities.” See section 2120.1, “Accounting,” for further discussion.

a bank’s investment is limited to 10 percent of its equity capital and reserves.

## RISK-BASED CAPITAL WEIGHTING

Australian CGBs are assigned to the 0 percent risk-weight category.

## LEGAL LIMITS FOR BANK INVESTMENT

Australian CGBs are a type III security. As such,

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Crossan, Ruth, and Mark Johnson, ed. *The Guide to International Capital Markets 1991*. London: Euromoney Publications PLC, 1991.

J.P. Morgan Securities. *Government Bond Outlines*. 9th ed. April 1996.

### GENERAL DESCRIPTION

The federal government of Canada issues bonds, known as "Canadas," to finance its public debt. The Canadian government bond market is the sixth largest in the world, with about C\$270 billion (U.S.\$195 billion) in bonds outstanding as of April 1996. Overall, this market is structurally similar to the U.S. bond market, particularly with regard to the types of securities issued. Canadas come in a wide variety of maturities ranging from 2 to 30 years. Recently, the longer maturity bonds have increased in popularity.

### CHARACTERISTICS AND FEATURES

Canadas are issued at a price close to par value and are denominated in C\$1,000, C\$25,000, C\$100,000, and C\$1 million allotments. Canadas are available in bearer form with coupons attached or in registered form. All new Canadian bonds are issued with bullet maturities and are not callable; there is one callable issue outstanding that matures in 1998. All Canadas have fixed coupons ranging from 3 percent to 18 percent. Real return bonds, inflation-indexed bonds, were introduced in December 1991 and are currently issued once per quarter. Principal and coupon payments for these bonds are linked to the Canadian consumer price index.

Interest on Canadas is paid semiannually and is accrued from the previous coupon date (exclusive) to the settlement date (inclusive) up to a maximum value of 181.5 days. As a result, the value date is always the same as the settlement date. New issues may offer short first coupons, but not long first coupons. Interest on short first coupons is accrued from the dated date to the first coupon date. Any "reopened" bonds include the accrued interest in the issue price to ensure that the new tranches carry the same coupons as the existing bond and trade indistinguishably. Canadas with remaining maturities of less than three years settle two market days after the trade date (T+2), while Canadas with maturities over three years settle three market days after the trade date (T+3).

### USES

Canadas are held for investment, hedging, and speculative purposes by both domestic (Canadian) and foreign investors. U.S. banks purchase Canadas to diversify their portfolios, speculate on currency and Canadian interest rates, and hedge Canadian-denominated currency positions and positions along the Canadian yield curve.

### DESCRIPTION OF MARKETPLACE

#### Issuing Practices

Canadas are issued by two methods: by allotment and auction. With the allotment system, the amount, coupon, and issue price for each of the maturity tranches is announced after consultation with the primary distributors. The Bank of Canada pays a commission to all primary distributors who are responsible for placing the issue.

The auction system is very similar to the U.S. system. On the Thursday before the regular Wednesday auction, the Bank of Canada announces details, including the size, maturity, and delivery date for the upcoming auction, and active open market trading begins on a yield basis. The coupon for new issues is not known until auction results are released, and it is set at the nearest ¼ percent increment below the auction average. The Bank of Canada accepts both competitive and noncompetitive bids from primary distributors. However, it will only accept one noncompetitive bid, which may have a maximum value of C\$2 million.

On the auction date, bids are submitted to the Bank of Canada and primary distributors receive bonds up to 20 percent of the total amount issued based on the competitiveness of their bids. The delivery date and dated date are usually ten days to two weeks after the auction. Issues typically range from C\$100 million to C\$8.8 billion, and any issue may be reopened by the Department of Finance based on market conditions.

#### Secondary Market

Canadas are not listed on any stock exchanges

but trade in over-the-counter (OTC) markets 24 hours a day. Settlement occurs through a book-entry system between market participants and the Canadian Depository for Securities (CDS). Therefore, Canadas may trade *when-issued* without an exchange of cash.

## Market Participants

### *Sell Side*

Primary distributors include investment dealers and Canadian chartered banks.

### *Buy Side*

A wide range of investors use Canadas for investing, hedging, and speculation, including domestic banks, trust and insurance companies, and pension funds. The largest Canadian holders of Canadas are trust pension funds, insurance companies, chartered banks, and the Bank of Canada.

Foreign investors are also active participants in the Canadian government bond market. In general, foreign market participants are institutional investors such as banks, securities firms, life insurance companies, and fund managers.

## Market Transparency

Price transparency is relatively high for Canadas and several information vendors disseminate prices to the investing public. Trading of Canadas, both domestically and internationally, is active and prices are visible.

## PRICING

Bonds trade on a clean-price basis (net of accrued interest) and are quoted in terms of a percentage of par value, with the fraction of a percent expressed in decimals. Canadas typically trade with a  $\frac{1}{8}$ - to  $\frac{1}{4}$ -point spread between bid and offer prices. Canadas do not trade ex-dividend. If a settlement date occurs in the two weeks preceding a coupon payment date, the seller retains the upcoming coupon but must compensate the buyer by postdating a check payable to the buyer for the amount of the coupon payment.

## HEDGING

Interest-rate risk on Canadas may be hedged using interest-rate swaps, forwards, futures (such as futures on 10-year and 5-year Canadas, which are traded on the Montreal Stock Exchange), and options (such as options on all Canadas issues, which are traded on the MSE). Hedging may also be effected by taking a contra position in another Canadian government bond. Foreign-exchange risk may be hedged through the use of currency forwards, futures, swaps, and options. The effectiveness of a particular hedge depends on the yield curve and basis risk. For example, hedging a position in a 10-year Canadas future with an overhedged position in a 5-year bond may expose the dealer to yield-curve risk. Hedging a 30-year bond with a Canadas future exposes the dealer to basis risk if the historical price relationships between futures and cash markets are not stable. Also, if a position in notes or bonds is hedged using an over-the-counter option, the relative illiquidity of the option may diminish the effectiveness of the hedge.

## RISKS

### Liquidity Risk

The Canadian bond market is considered to be one of the most liquid bond markets in the world, with Canadas traded actively in both domestic and international capital markets. Most investment dealers in Canadas will make markets on all outstanding issues. The most liquid issues are the short-term issues of less than 10 years, but several 15-year and 30-year Canadas are actively traded and very liquid. All government bond issues are reasonably liquid when their outstanding size, net of stripping, is over C\$1 billion. "Orphaned" issues, small issues that are not reopened, are the only Canadas that are very illiquid because they are not actively traded.

### Interest-Rate Risk

Canadas are subject to price fluctuations due to changes in interest rates. Longer-term issues tend to have more price volatility than shorter-term issues and, therefore, a large concentration

of longer-term maturities in a bank's portfolio may subject the bank to a high degree of interest-rate risk.

### Foreign-Exchange Risk

Due to the low volatility of the Canadian dollar exchange rate, there has been a low level of foreign-exchange risk associated with Canadian bonds. To the extent that this risk exists, it can be easily reduced by using foreign-currency derivatives instruments as described above.

### Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulation governing foreign bond issuance, trading, transactions, and authorized counterparties.

### ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by SFAS 115, "Accounting for Certain Investments in Debt and Equity Securities," as amended by SFAS 125, "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabili-

ties." See section 2120.1, "Accounting," for further discussion.

### RISK-BASED CAPITAL WEIGHTING

Canadas are assigned to the 0 percent risk-weight category.

### LEGAL LIMITS FOR BANK INVESTMENT

Canadas are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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## GENERAL DESCRIPTION

The French Treasury is an active issuer of three types of government debt securities, which cover all maturities. Obligation Assimilable du Tresor (OATs), issued since 1985, are the French government's long-term debt instruments with maturities of up to 30 years. Bons du Tresor a Taux Fixe et Interest Annuel (BTANs) are medium-term, fixed-rate notes with maturities of up to five years. The French Treasury also issues discount Treasury bills, Bons du Tresor a Taux Fixe et Interest Precomptes (BTFs), with maturities of up to one year. In addition, an active market for stripped OATs has developed since May 1991. Stripping involves separating a bond's interest and principal payments into several zero-coupon bonds.

French government securities are mainly denominated in French francs (FFr). However, the Treasury has also been issuing OATs and BTANs in European Currency Units (ECUs) since 1989 and 1993, respectively. Until 1985, the French Treasury issued bonds known as Emprunts d'Etats. However, these bonds are approaching the end of their trading life and are illiquid. The following discussion will focus on OATs, BTANs, BTFs, and stripped securities.

## CHARACTERISTICS AND FEATURES

The French Treasury issues OATs in units of FFr 2,000 (ECU 500), with maturities of up to 30 years. Most OATs carry a fixed interest rate and have bullet maturities. However, some OATs are issued with floating rates that are referenced to various short-term or long-term indexes. OATs generally pay interest annually. OATs are settled three days after the trade date (T+3), both domestically and internationally. OATs are cleared through the SICOVAMs Relit system domestically, while OATs that settle internationally are cleared through Euroclear or Cedel.

BTANs and BTFs are issued in units of FFr 1 million (ECU 1,000). All BTANs are fixed-rate, bullet maturity notes with maturities of up to five years. Interest on BTANs is paid annually on the 12th of the month. Domestic settlement for BTANs and BTFs usually occurs one day after the trade date (T+1) through the Bank of

France's Saturne system. Internationally, BTANs and BTFs settle three days after the trade date. Like OATs, BTANs and BTFs may also be cleared through Euroclear or Cedel. Interest on all government bonds and notes is calculated using a 30/360-day count convention in which each month is assumed to have 30 days.

Since May 1991, French government securities primary dealers, *Specialistes en Valeurs du Tresor* (SVTs), have been allowed to strip most long-term OATs. Primary dealers may strip OATs denominated in either FFr or ECUs and subsequently reconstitute them. All stripped coupons carry a face value of FFr 5 (ECU 1.25). This is done to ensure the fungibility of receipts that have the same maturities but are derived from OATs of different maturities.

## USES

French government securities are used for investment, hedging, and speculative purposes. They are considered attractive for investment purposes by foreign and domestic investors because of the market's liquidity, lack of credit risk, and wide range of maturities and structures (for example, fixed vs. floating rate). Foreign investors often choose to invest internationally to enhance the diversification of their investment portfolios or derive higher returns. Stripped OATs can be used as tools for hedging or asset liability management purposes, for example, to immunize a portfolio in terms of interest-rate risk. Speculators also use OATs, BTANs, and stripped OATs to take positions on the direction of interest-rate changes and yield curve shifts. Finally, there is an active market for futures and options on French government securities traded on the *Marche a terme international de France* (Matif), the Paris financial futures exchange.

## DESCRIPTION OF MARKETPLACE

### Issuing Practices

The French Treasury issues OATs, BTANs, and BTFs through Dutch Auction. The Treasury usually issues tranches of securities that are part of a single borrowing line. The auction schedule

is generally announced several months in advance. Securities are supplied at the price or effective rate tendered by the bidder rather than the marginal price or rate. The highest bids are filled first, followed by lower bids. Although bidding is open to any institution that has an account with the SICOVAM, Saturne, or Bank of France, SVTs account for 90 percent of the securities bought in the primary market. SVTs also quote two-way prices on a *when-issued* basis several business days before an auction.

## Secondary Market

There is an active secondary market for most issues of French government securities. OATs, BTANs, and BTFs are listed on the Paris Stock Exchange, but are principally traded over the counter. SVTs are responsible for making markets in these securities and account for most of the trading activity. However, other broker-dealers, banks, and specialized financial institutions are also active participants in the secondary market. Since 1994, the repo market in French government securities has grown considerably. The repo market, also managed by the SVTs, allows investors to finance short-term positions.

## Market Participants

### *Sell Side*

Since 1987, a network of primary government securities dealers, known as *Specialistes en Valeurs de Tresor* (SVTs), has managed the market for French government securities. The SVTs work closely with the French Treasury in determining issuance policy, market conditions, and prices. SVTs are required to quote prices for clients and other primary dealers in tradeable securities and are responsible for the maintenance of liquid primary and secondary markets. In exchange, the French Treasury permits SVTs to strip and reconstitute OATs and participate in noncompetitive bidding.

### *Buy Side*

French government securities are used for investment, hedging, and speculative purposes by a

wide range of institutional investors, both international and domestic. This includes insurance companies, pension funds, mutual funds, and commercial and investment banks.

## Market Transparency

The market of French government bonds is active and market transparency is relatively high for most issues. The French Treasury regularly publishes the debt issuance schedule and other information on the management of its debt. Auction results, trading information, and prices for most issues are available on interdealer broker screens such as Reuters, Telerate, and Bloomberg.

## PRICING

OATs are quoted as a percentage of par to two decimal places. For example, the price quote of 106.85 refers to an OAT that is trading at 106.85 percent of its par value. Strips are quoted on the basis of their yield. BTANs and BTFs are quoted on an annual-yield basis to two decimal places.

## HEDGING

The interest-rate risk of French government securities can be hedged in the futures or options market at the Matif or by taking a contra position in another French government security. Swaps and options can also be used to hedge interest-rate risk. The effectiveness of a particular hedge is dependent on yield curve and basis risk. For example, hedging a position in a five-year note with an overhedged position in a three-year note may expose the dealer to yield curve risk. Hedging a 30-year bond with a treasury bond future exposes the dealer to basis risk if historical price relationships between futures and cash markets are not stable. Also, if a position in notes or bonds is hedged using an OTC option, the relative illiquidity of the option may diminish the effectiveness of the hedge.

International investors are also exposed to foreign-exchange risk. Foreign-exchange risk can be hedged using currency forwards, futures, swaps, or options. An international investor can

use a series of forward foreign-exchange contracts corresponding to each of the coupon payments and the final principal payment to hedge this risk. Swaps, futures contracts, or currency options, traded either on the Matif or over the counter, can also be used to hedge currency risk.

## RISKS

### Liquidity Risk

French bonds are among the most liquid in Europe. Because the French Treasury issues OATs and BTANs as tranches of existing bonds, most bond issues have sizable reserves and liquidity. SVTs make a market in French government bonds, a practice that enhances liquidity of the market. The most recently issued 10-year OAT generally serves as the benchmark, and is thus the most liquid of these issues. For the medium-term market, the most recent issues of two- and five-year BTANs serve as the benchmark. Next to the U.S. Treasury strip market, French strips are the most liquid in the world. As stated above, the face value of all stripped OATs is FFr 5 (ECU 1.25) ensuring the fungibility of coupons of different maturities. Because primary dealers may reconstitute strips at any time, their liquidity is comparable to the reference OAT.

### Interest-Rate Risk

From the perspective of an international investor, the market risk of French government bonds consists primarily of interest-rate risk and foreign-exchange risk. The interest-rate risk of a French government bond depends on its duration and the volatility of French interest rates. Bonds with longer durations are more price sensitive to changes in interest rates than bonds with shorter durations. Because they are zero-coupon instruments, French strips have longer durations than OATs of comparable maturity, and they are more volatile.

### Foreign-Exchange Risk

From the perspective of an international investor, the total return from investing in French

government securities is partly dependent on the exchange rate between the U.S. dollar and the French franc (or ECU). Several factors affect the volatility of a foreign-exchange rate, including the country's balance of payments and prospective changes in that balance, inflation and interest-rate differentials between countries, the social and political environment, relative changes in the money supply, and central bank intervention in the currency markets. Traditionally, the French foreign-exchange rate has been relatively stable.

### Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

## ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by SFAS 115, "Accounting for Certain Investments in Debt and Equity Securities," as amended by SFAS 125, "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." See section 2120.1, "Accounting," for further discussion.

## RISK-BASED CAPITAL WEIGHTING

French government bonds and notes are assigned to the 0 percent risk-weight category.

## LEGAL LIMITS FOR BANK INVESTMENT

French government bonds and notes are type III securities. A bank's investment in them is limited to 10 percent of its equity capital and reserves.

## REFERENCES

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## GENERAL DESCRIPTION

The federal government of Germany issues several types of securities: bonds (Bunds), notes (Bobls and Schätze) and Treasury discount paper (U-Schätze). Government agencies such as the Federal Post Office and the Federal Railway have also issued bonds (Posts and Bahns) and notes (Schätze). In addition, with the unification of West and East Germany in October 1990, the German Unity Fund began to issue Unity Fund bonds (Unities) and notes (Schätze). The outstanding debt issues of the Post Office, Railway, and Unity Fund have since been folded into the so-called Debt Inheritance Fund, which has led to an explicit debt service of these issues through the federal government. Hence, these issues are guaranteed by the full faith and credit of the federal government. All government-guaranteed securities are available in book-entry form only.

The government also issues U-Schätze, zero-coupon Treasury notes with maturities of one to two years which may not be purchased by foreigners, and short-term Treasury bills, with one-half- to one-year maturities, which may be purchased by foreigners. However, the secondary market for these instruments is small and does not attract substantial foreign investment. Therefore, the following discussion will focus on bonds and notes.

## CHARACTERISTICS AND FEATURES

Bunds are issued regularly, usually in deutschemarks (DM) 20 billion to DM 30 billion blocks, with maturities ranging from 8 to 30 years. Bunds are issued in a minimum denomination of DM 1,000, and a typical issue carries a maturity of 10 years. Bunds are redeemable in a lump sum at maturity at face value (bullet structure) with interest paid annually. Until 1990, all bonds issued by the federal government and other public authorities were noncallable and bore a fixed coupon. However, since February 1990, some callable floating-rate bonds have been issued.

Special five-year federal notes (Bobls) have been issued by the federal government since 1979, but foreign investment in these securities has been permitted only since 1988. In the past,

medium-term notes with four- to six-year maturities (Schätze) were issued irregularly by the federal government, the Unity Fund, and the Federal Post Office and Railway. However, in 1995, the Ministry of Finance decided to discontinue the issuance of these securities to create more transparency in the market. All Bobls and existing Schätze issues are fixed-coupon securities with bullet maturities.

Stock-exchange settlement takes place two market days after trade date (T+2). International settlement takes place three business days after trade date (T+3). As of January 1, 1994, German federal government notes and bonds no longer trade ex-coupon. They trade on a cum-coupon basis; the purchaser of the bond pays the seller accrued interest from the last coupon date to settlement. Interest is accrued on a 30/360-day-count basis in which each month is assumed to have 30 days and a year is assumed to have 360 days.

## USES

German government bonds and notes are used for investment, hedging, and speculative purposes. Foreign investors, including U.S. banks, often purchase German government securities as a means of diversifying their securities portfolios. In particular, the low credit risk and deep liquidity of German government bonds and notes encourages the use of these instruments as non-U.S. investment vehicles. German government securities may also be used to hedge German interest-rate risk or foreign-currency risk related to positions in deutschemarks. Speculators may use German government bonds to take positions on changes in the level and term structure of German interest rates or on changes in the foreign-exchange rates between Germany and the United States. Because it is a deep and efficient market, some German futures contracts and options are priced relative to Bund issues.

## DESCRIPTION OF MARKETPLACE

### Issuing Practices

Bunds are issued using a combination of syndi-

cation and bidding procedures. Part of the issue is offered at fixed terms to the members of the Federal Bond Consortium, which consists of German banks, foreign banks in Germany, and the Deutsche Bundesbank (German Central Bank). The Bundesbank is the lead bank in the syndicate and determines the allocation of the offerings among the syndicate members. These allocations are changed infrequently. During the syndicate meeting, the coupon rate, maturity, and issue price are determined by the government and syndicate, although the total size of the issue is unknown. Syndicate members receive a fee from the government for selling bonds received through syndicate negotiations.

A further tranche is issued to the syndicate by means of an American-style auction. The terms—coupon rate, maturity, and settlement date—are the same as those determined in the syndicate meeting, although the overall size of the issue is not specified. The German Central Bank accepts bids starting with the highest price and accepts lower bids until the supply of securities it wishes to sell is depleted. Noncompetitive bids may also be submitted, which are filled at the average accepted price of the auction. The size of the issue is announced after the auction. The difference between the issue size and the amount that has been issued through the underwriting syndicate plus the auction is retained by the Bundesbank for its bond market operations.

Bobls are issued on a standing-issue basis (similar to a tap form in which a fixed amount of securities at a fixed price is issued when market conditions are considered favorable) with stated coupon and price. During the initial selling period, which may last a few months, the price is periodically adjusted by the Ministry of Finance to reflect changes in market conditions. The sales of a given series are terminated when either the issuing volume has been exhausted or the nominal interest rate has moved too far away from the going market rate. The new series is launched within a short period of time. Only domestic private individuals and domestic non-profit institutions are permitted to purchase the issues in the primary market. German banks (which cannot purchase these securities for their own account) receive a commission for selling the bonds to qualified investors. After the selling period is over and an issue is officially listed on the German stock exchange, the securities may be purchased by any investor.

## Secondary Market

German bonds are listed and traded on all eight German stock exchanges seven days after they are issued. Bobl issues are officially listed on the stock exchanges after the initial selling period of one to three months. In addition to the stock-exchange transactions, substantial (OTC) over-the-counter trading occurs. In Germany, the secondary market for both stocks and bonds is primarily an interbank market.

For some issues, prices are fixed once during stock-exchange hours (stock-exchange fixing takes place from 11:00 a.m. to 1:30 p.m. Greenwich mean time +1). However as of October 3, 1988, variable trading was introduced at the German stock exchanges for Bunds, Bobls, Bahns, and Posts issued after January 2, 1987, with a minimum size of DM 2 billion. The Unity Fund issues also participate. After the fixing of the prices on the stock exchanges, the securities are traded on the OTC market (OTC hours are from 8:30 a.m. to 5:30 p.m.). Bunds are typically quoted in the OTC market on the basis of a difference from the fixing price, for example, a price quote of -10 means a price of 10 pfennigs ( $\frac{1}{100}$  of a DM) less than the fixing price.

Seventy to 80 percent of the secondary-market trading of Bunds, Bahns, and Posts takes place in the OTC market. About 75 percent of Bobl trading takes place in the OTC market, as does most Schätze trading. However, the stock markets are important because the prices determined there provide standard, publicly available benchmarks.

## Market Participants

### *Sell Side*

The underwriting of public authority bonds is done by the Federal Bond Syndicate, which consists of German banks, foreign banks in Germany, and the Deutsche Bundesbank (German Central Bank). German banks are responsible for placing Bobls with qualified investors.

### *Buy Side*

Domestic banks are the largest holders of German bonds, and private German individuals are the second largest investment group due in

part to the propensity of German households to save and invest their savings. German insurance companies are also major holders of German bonds, as are German investment funds. Foreign investors, such as U.S. commercial and investment banks, insurance companies, and money managers also hold German government securities.

## Market Transparency

The market for German government bonds and notes is active and liquid, and price transparency is considered to be relatively high for these securities. Several vendors, including Reuters and Telerate, disseminate price information to the investing public.

## PRICING

Bonds and notes are quoted as a percentage of par to two decimal places. For example, a price of 98.25 means that the price of the bond or note is 98.25 percent of par. Bonds are traded on a price basis, net of accrued interest (clean). Prices generally move in increments of five pfennigs. The bid/offer spread is usually eight pfennigs for liquid issues and fifteen pfennigs for less liquid issues. For notes, bid/offer spreads are 5 to 10 pfennigs for liquid issues.

## HEDGING

Interest-rate risk can be hedged using swaps, forwards, futures, or options, or by taking a contra position in another German government security. The effectiveness of a particular hedge is dependent on yield curve and basis risk. For example, hedging a position in a five-year note with an overhedged position in a three-year note may expose the dealer to yield curve risk. Hedging a 30-year bond with a bond future exposes the dealer to basis risk if the historical price relationships between futures and cash markets are not stable. Also, if a position in notes and bonds is hedged using an OTC option, the relative illiquidity of the option may diminish the effectiveness of the hedge. Foreign-exchange risk may be hedged with currency swaps, forwards, futures, and options.

## RISKS

### Liquidity Risk

The German government bond market is the third largest bond market in the world, and is considered the most liquid government bond market after the U.S. government bond market. Bunds are the most liquid and actively traded bond issues in Germany. Unities issued by the German Unity Fund are generally as liquid as Bunds, but Bahn and Post issues of government agencies are fairly limited compared with the federal government's bonds. Therefore, these agency securities tend to be less liquid and generally trade at a higher yield than Bunds.

The on-the-run (most recent) Bund issue is the most liquid of its category and serves as the benchmark. The most liquid area of the Bund yield curve is in the 8- to 10-year maturity range, as most Bund issues carry a 10-year maturity. Similar to Bunds, on-the-run Bobls are the most liquid type of note. Off-the-run prices are not as transparent as current coupon securities, which makes these issues less liquid and trading more uncertain. Of course, larger issues of bonds and notes are generally more liquid than smaller ones.

At the stock exchange, the Bundesbank makes a market in Bunds, Bobls, Unities, and Post issues. The Bundesbank is responsible for maintaining an orderly secondary market in these securities and regularly intervenes to support or regulate their prices. This tends to increase the liquidity in the market for these issues. However, the Bundesbank is not responsible for stabilizing Schätze prices. For this reason, these securities tend to be much less liquid than Bunds or Bobls; their issue sizes are also normally much smaller. The Railway Bank makes a market in Bahn issues, which enhances the liquidity of these issues.

### Interest-Rate Risk

German bonds and notes are subject to price fluctuations due to changes in German interest rates. The variation in the term structure of interest rates accounts for the greatest amount of local market risk related to foreign bonds. Longer-term issues have more price volatility due to interest-rate fluctuations than do shorter-term instruments. Therefore, a large concentration of long-term maturities may subject a bank's

investment portfolio to unwarranted interest-rate risk.

## Foreign-Exchange Risk

Currency fluctuations can account for up to two-thirds of the return and risk of an unhedged international fixed-income portfolio. There are two types of currency risk related to foreign bonds: (1) the coupons and face value are paid in the foreign currency, which means that any change in the exchange rate affects the bond's value to the U.S. investor, and (2) the bond's yield may be affected by currency movements.

A number of factors exert a direct influence on foreign-exchange rates, including the balance of payments and prospective changes in that balance; inflation and interest-rate differentials between Germany and the United States; the social and political environment in Germany, particularly with regard to the impact on foreign investment; and central bank intervention in the currency markets. Historically, German exchange rates have been very stable.

## Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

## ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by SFAS 115, "Accounting for Certain Investments in Debt

and Equity Securities," as amended by SFAS 125, "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." See section 2120.1, "Accounting," for further discussion.

## RISK-BASED CAPITAL WEIGHTING

German government bonds and notes are assigned to the 0 percent risk-weight category.

## LEGAL LIMITS FOR BANK INVESTMENT

German government bonds and notes are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

## REFERENCES

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### GENERAL DESCRIPTION

Irish government bonds (IGBs) are issued by the National Treasury Management Agency (NTMA), which is responsible for the management of Ireland's national debt. Bonds are issued to fund the government's borrowing requirements and to fund maturing bond issues.

### CHARACTERISTICS AND FEATURES

Bonds are issued in maturities of 5, 10, and 20 years. Issues are transferable in any amount and are listed and traded on the Irish stock exchange. Fixed-rate bonds issued before 1993 pay interest semiannually, while bonds issued since then pay interest annually. Coupons on variable-rate bonds are paid quarterly. Interest is accrued from the coupon payment date to the settlement date, and bonds go ex-dividend on the Wednesday nearest to three weeks before the coupon is paid. Interest is computed using the actual/365-day-count convention on semiannual coupon bonds and using the 30/365-day-count convention on annual coupon bonds. Settlement is done the day after the trade date (T+1) domestically and three days after the trade date (T+3) internationally. IGBs are available in registered form and are cleared through the Central Bank of Ireland Securities Settlement System (CBISS).

### USES

Irish government bonds and notes are used for investment, hedging, and speculative purposes, by both domestic (Irish) and foreign investors and traders. U.S. banks purchase Irish government bonds to diversify their portfolios, speculate on currency and Irish interest rates, and to hedge Irish-denominated currency positions and positions along the Irish yield curve.

### DESCRIPTION OF MARKETPLACE

#### Issuing Practices

About 80 percent of issuance is by the tap

system, and the rest of the bonds are issued by regular auctions. Taps are sales of a fixed amount of securities at a fixed price when market conditions are considered favorable. The type of bond and size of the tap issue are communicated to the market, but the price is only communicated to the primary dealers who bid by telephone. The auction system has both a competitive and noncompetitive element. The competitive auction is open to all investors who may bid directly or via a primary dealer or stockbroker. Following the auction, noncompetitive bids are filled at the average auction price. Only primary dealers may submit noncompetitive bids.

#### Secondary Market

IGBs are listed on the Dublin, Cork, and London Stock Exchanges and are also traded in the over-the-counter (OTC) market.

#### Market Participants

##### *Sell Side*

Six primary dealers quote firm bid and offer prices in each of a specified list of eight bonds. In return for their market-making services, the NTMA provides these dealers with exclusive access to the supply of bonds issued in tap form. The designated brokers are CS First Boston, UBS Ltd., Davy, Goodbody, NCB, and Riada.

##### *Buy Side*

The principal holders of IGBs are domestic (Irish) and foreign institutional investors, such as banks, securities firms, insurance companies, pension funds, and money managers.

#### Market Transparency

Price transparency is relatively high for Irish government securities as a result of the structure of the primary dealer system, which enhances liquidity. Several information vendors disseminate prices to the investing public.

## PRICING

Bonds are quoted as a percent of par to two decimal places. The price paid by the buyer does not include accrued interest. The bid/offer spread ranges from .05 to .20 basis points, depending on the liquidity of the issue.

## HEDGING

Interest-rate risk may be hedged by taking contra positions in government securities or by using swaps or futures. Foreign-exchange risk can be hedged by using currency swaps, futures, or forward rate agreements.

## RISKS

### Liquidity Risk

Active portfolio management, the wide range of coupons and maturities available, and the development of a trading, rather than a purely investment outlook, among Irish investors has increased the liquidity of the Irish government bond market. The large issues tend to be very liquid throughout the yield curve, particularly the eight bonds in which the primary dealers are obliged to make markets.

### Interest-Rate Risk

IGBs are exposed to interest-rate risk as a result of the inverse relationship between bond prices and interest rates. Longer-term issues have more price volatility than short-term instruments.

### Foreign-Exchange Risk

Currency fluctuations may affect the bond's yield as well as the value of coupons and principal paid in U.S. dollars. The low level of inflation in Ireland and the Irish government's interventions to maintain the value of the currency within the margins prescribed by the Exchange Rate Mechanism (ERM) of the European Monetary System have made many investors consider securities denominated in IR£ a good foreign investment choice with little significant exchange risk.

## Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

## ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by SFAS 115, "Accounting for Certain Investments in Debt and Equity Securities," as amended by SFAS 125, "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." See section 2120.1, "Accounting," for further discussion.

## RISK-BASED CAPITAL WEIGHTING

Irish government bonds are assigned to the 0 percent risk weight category.

## LEGAL LIMITS FOR BANK INVESTMENT

Irish government bonds are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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## GENERAL DESCRIPTION

The Italian Treasury issues bonds, notes, and bills, which are guaranteed by the Italian government. These securities are issued with maturities ranging from three months to 30 years in a wide variety of structures. These structures include Treasury bonds, Treasury floating-rate notes, Treasury notes with a put option, and short-term Treasury bills. The Treasury also issues notes and bills denominated in European Currency Units (ECUs). Government securities are issued in book-entry form but may be converted to bearer form following issuance.

## CHARACTERISTICS AND FEATURES

Treasury bonds, or Buoni del Tesoro Poliennali (BTPs), are fixed-coupon medium- to long-term government bonds with semiannual dividend payments. These bonds have played an important role in financing the Treasury, especially after the establishment of the Telematic Market for government bonds, which provides the liquidity necessary for these instruments. These bonds are issued with 5-, 10-, and 30-year maturities in denominations of lire 5, 10, 50, 100, 500, and 1,000 million. Interest on these bonds is paid through deferred semiannual coupons.

Treasury floating-rate notes, or Certificati di Credito del Tesoro (CCTs), are floating-rate notes indexed to T-bill rates. CCTs are generally issued in denominations of lire 5, 10, 50, 100, 500, and 1,000 million, with 7-year maturities, although 5- and 10-year notes have also become popular. Interest on these bonds is paid through deferred semiannual or annual dividend coupons, with rates indexed to Italian Treasury Bill (BOT) yields. For BOTs issued after December 1994, the coupon is calculated by adding a spread of 30 basis points to the six-month T-bill recorded in the last auction. For issues before December 1994, the coupon is calculated by adding a spread of 30 basis points to the average gross semiannual yields of one-year BOTs auctioned in the second and third months preceding the coupon period.

Treasury notes with options, or Certificati del Tesoro con Opzione (CTOs), are fixed-coupon securities with an embedded put. The embedded option in the CTO permits investors to redeem the bond halfway through nominal maturity, and it is designed to encourage investors to extend their investment horizons. Any request for refunding must be forwarded within an 11-day period beginning precisely one month before the scheduled date for anticipated redemption. The bonds are issued in maturities similar to BTPs. The Treasury has not issued any CTOs since May 1992.

Treasury notes denominated in ECUs, or Certificati del Tesoro in ECU (CTEs), were introduced by the Italian government in 1982 as part of an effort to diversify the instruments issued for financing public deficits. They are fixed-coupon ECU-denominated bonds issued in denominations of ECU 5,000, 10,000, 100,000, 500,000, and 1 million, generally with a five-year maturity. The foreign-currency weighting of the CTEs is attractive to investors who fear devaluation of Italian exchange rates. Interest on these bonds is paid in the form of deferred annual coupons in ECUs or, at the holder's request, in an ECU-equivalent lira amount.

Domestic and international settlement of Italian government bonds takes place three business dates after the trade date (T+3). The only exception is BOTs, which settle two business dates after the trade date (T+2). Italian government bonds with a coupon can be settled via Euroclear or Cedel. Settlement through Euroclear and Cedel takes five days. Interest is calculated using a 30/360-day count in which each month is assumed to have 30 days.

## USES

Italian government securities are used for investment, hedging, and speculative purposes. While investors may buy Italian bonds as part of diversifying their investment portfolios, the bonds may also be used to hedge positions that are sensitive to movements in interest rates. Speculators, on the other hand, may use long-term bonds to take positions on changes in the level and term structure of interest rates.

## DESCRIPTION OF MARKETPLACE

### Issuing Practices

Italian government bonds are issued via a marginal auction, in which there is no base price. Each allotment is made at the marginal accepted bid which represents the stop-out price, below which no bids are considered. Partial allotments may be given at the stop-out price if the amount bid at that price exceeds the amount not covered by the higher-priced bids. Each participant is limited to three bids. The exclusion price, or the price below which no bids will be accepted, is calculated by listing the bids in decreasing order and proceeding as follows:

If the amount of competitive bids is greater than or equal to the amount offered—

- take the amount of bids (in a decreasing price order) needed to cover half the offered amount,
- calculate the weighted average of the above set of bids, and
- subtract 200 basis points from the weighted average to obtain the exclusion price.

If the amount of competitive bids is less than the amount offered—

- take half of the bids in a decreasing price order,
- calculate the weighted average of the above set of bids, and
- subtract 200 basis points from the weighted average to obtain the exclusion price.

Once the exclusion yield is calculated, bids are accepted in decreasing order of price. Bids are accepted to the point that covers the amount to be offered up to the stop-out price. Partial allotments may be given at the stop-out price if the amount bid at that price exceeds the amount not covered by the higher-priced bids. Noncompetitive bids may also be accepted and awarded at the average of accepted competitive bids plus a Treasury spread.

The Treasury makes an announcement of auction dates annually and also makes a quarterly announcement of the types of bonds and minimum issue sizes to be offered in the following three months. The auctions are held at the beginning and middle of the month. Generally, 3- and 5-year bills are sold on the same day, 10- and 30-year bonds are sold together,

and CCTs are sold on the third day of the auctions.

The Bank of Italy may reopen issues, that is, sell new tranches of existing bonds, until the level outstanding reaches a certain volume, generally over lire 10 trillion. After that threshold volume is reached, a new bond must be issued. If an issue is reopened, the Bank of Italy issues new tranches of securities with the same maturities, coupons, and repayment characteristics as existing debt. The ability to reopen issues improves liquidity and avoids the potential poor pricing of securities that often occurs when a market is flooded with one very large issue.

### Secondary Market

Italian government bonds can be traded on any of the following: the Milan Stock Exchange, the telematic government bond spot market (Mercato Telematico dei Titoli di Stato or MTS), and the over-the-counter (OTC) market. Bonds may be traded on the Milan Stock Exchange if they are transformed into bearer bonds (at least six months after being issued). The stock exchange is the reference market for the small saver as only small dealings are transacted there. At the end of the day, the exchange publishes an official list of the prices and volumes of trading. The MTS is the reference market for professional dealers.

## MARKET PARTICIPANTS

### Sell Side

Only banks authorized by the government of Italy may act as primary dealers of Italian government bonds. Branches of foreign banks and nonfinancial institutions can also act as dealers, provided they are residents in the European Union and subject to comparable financial regulations.

### Buy Side

A wide range of investors use Italian government bonds for investing, hedging, and speculation. This includes domestic banks, nonfinancial corporate and quasi-corporate public and private enterprises, insurance companies, and

private investors. Foreign investors, including U.S. commercial banks, securities firms, insurance companies, and money managers, are also active in the Italian government bond market.

## Market Transparency

The Italian government bond market is an active one. Price transparency is relatively high for Italian government securities as several information vendors, including Reuters, disseminate prices to the investing public.

## PRICING

Prices and yields of Italian government securities are stated as a percentage of par to two decimal places. For instance, a price of 97.50 means that the price of the bond is 97.50 percent of par. The price spread is generally narrow due to the efficiency of the market.

Bonds trade on a clean-price basis, quoted net of accrued interest. Italian government bonds do not trade ex-dividend. Interest on Italian bonds is accrued from the previous coupon date to the settlement date (inclusive). In this regard, Italian bonds pay an extra day of interest compared with other bond markets.

## HEDGING

Italian government bonds can be hedged for interest-rate risk in the Italian futures market (Mercato Italiano Futures or MIF) as well as the London International Financial Futures Exchange (LIFFE). The MIF and LIFFE offer futures on 10-year Italian government securities, and the MIF offers futures on five-year Italian government securities. The LIFFE also offers OTC options on individual bonds as well as options on futures contracts. OTC forwards and swaps can also be used to hedge interest-rate risk.

The effectiveness of a hedge depends on the yield curve and basis risk. For example, hedging a position in a five-year note with an overhedged position in a two-year note may expose the dealer to yield curve risk. Hedging a 30-year bond with an Italian bond future exposes the dealer to basis risk if the historical price relationships between futures and cash markets are not stable. Additionally, if a position in notes or

bonds is hedged using an OTC option, the relative illiquidity of the option may diminish the effectiveness of the hedge.

## RISKS

### Liquidity Risk

The Italian bond market is one of the most liquid markets in the world. Liquidity is maintained by 40 market makers which include 16 specialists, top-tier market makers (Morgan Guaranty, Milan), and 24 other market makers who are obligated to quote two-way prices. Ten market makers have privileged access to the Bank of Italy on the afternoon of an auction to buy extra bonds at the auction price. The purchases are subject to a limit set by the Bank. For instance, if a particular issue were oversubscribed and prices were likely to shoot up, the selected market makers would be able to buy more of the same bond and maintain or increase market liquidity.

As discussed above, the Bank of Italy may reopen issues until they reach a certain volume before selling a new bond. The ability to reopen issues improves liquidity and avoids the unfavorable pricing which may occur if the market is flooded with one very large issue. Liquidity is also maintained by limiting the number of government entities that issue debt. In the case of Italy, only the central government may issue debt securities.

### Interest-Rate Risk

Italian government bonds are subject to price fluctuations due to changes in interest rates. Longer-term issues have more price volatility than shorter-term instruments. Therefore, a large concentration of longer-term maturities in an investment portfolio may increase interest rate risk.

### Foreign-Exchange Risk

From a U.S. investor's perspective, there are two types of risk related to foreign bonds: (1) the coupons and face value are paid in the foreign currency, which means that any change in the exchange rate affects the bond's value to the

U.S. investor, and (2) the bond's yield may be affected by currency movements. A number of factors exert a direct influence on foreign-exchange rates, including the balance of payments and prospective changes in that balance; inflation and interest-rate differentials between Italy and the United States; the social and political environment in Italy, particularly with regard to the impact on foreign investment; and central bank intervention in the currency markets.

### Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

### ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by SFAS 115, "Accounting for Certain Investments in Debt and Equity Securities," as amended by SFAS 125, "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." See section 2120.1, "Accounting," for further discussion.

### RISK-BASED CAPITAL WEIGHTING

Italian government bonds and notes are assigned to the 0 percent risk-weight category.

### LEGAL LIMITS FOR BANK INVESTMENT

Italian government notes and bonds are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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## GENERAL DESCRIPTION

Japanese government bonds (JGBs) are issued by the Japanese national government. The Ministry of Finance (MOF) authorizes the issuance of coupon and non-coupon-bearing JGBs in a variety of maturities: long-term (10 and 20 years) and medium-term (two through five years). The MOF also issues short-term Treasury bills, which are issued at a discount with a maturity of 180 days. JGBs are guaranteed by the Japanese national government and, therefore, are considered to have very little credit risk.

## CHARACTERISTICS AND FEATURES

The two types of long-term bonds are “long-term” and “super long-term.” The long-term bond, the most common, has a maturity of 10 years, and the super long-term bond has a 20-year maturity. Both long-term and super long-term bonds are numbered serially. They are referred to by number and issue month (for example, #182 August) rather than by maturity and coupon. JGB issues are categorized as construction bonds, deficit financing bonds, or refunding bonds, although there is no difference among these bonds from an investment perspective.

JGBs are typically issued in registered form but they may be converted to bearer form within two market days of issue. Exchange transactions of registered bonds must be issued in blocks of 1,000. There are no such restrictions for bearer bonds. JGBs have bullet maturities and are callable at any time, although call provisions are rarely exercised. Ten-year JGBs maturing after mid-1997 pay interest on the standard March/September or June/December semiannual coupon cycle. Twenty-year JGBs, however, pay interest only in March and September. Since new issues can appear monthly, the practice of using quarterly coupon dates leads to odd first coupons for both 10- and 20-year JGBs.

The two types of medium-term bonds are coupon bonds and five-year discount, or zero-coupon, bonds. Medium-term coupon bonds are issued with maturities of two, three, and four years. Issue sizes of both types of bonds vary

considerably from month to month. However, the most common issue sizes are yen (¥) 50,000, ¥ 100,000, ¥ 1 million, ¥ 10 million, and ¥ 100 million. Medium-term coupon bonds make interest payments semiannually, and redemption is on the 20th day of the month in which the bond matures.

Previously, trades in JGBs were settled on the 5th, 10th, 15th, 20th, 25th and 30th of each month, based on trade date. This convention has been replaced by a T+7 (trade date plus seven Japanese business days) settlement method as of September 19, 1996.

## USES

Domestic and foreign investors use JGBs for investment, hedging, and speculative purposes. U.S. investors, including commercial banks, may purchase JGBs to speculate on interest rates or foreign-exchange rates, to diversify portfolios, to profit from spreads between U.S. and Japanese interest rates, and to hedge various positions.

## DESCRIPTION OF MARKETPLACE

### Issuing Practices

The Bank of Japan (BOJ) is responsible for issuing JGBs in an aggregate amount not to exceed the limit set by the MOF. JGBs are issued monthly by the BOJ by competitive auction and syndicate. A syndicate comprising banks, life insurance companies, and securities firms underwrite 40 percent of each 10-year issue. The remaining 60 percent are issued via competitive auction. The coupon size and issue size are announced on the day of the auction after consultation with the syndicate. The average auction price determines the price of the syndicated portion. No firm may bid for more than 30 percent of the tranche issued via competitive auction. All 20-year bonds are issued via fully competitive auction. Medium-term coupon bonds are issued primarily through public subscriptions, but a certain portion are issued through fixed-rate private placements.

## Secondary Market

Most JGBs are listed on the Japanese stock exchanges, although the majority of JGB trading occurs in the over-the-counter (OTC) market. While the OTC market is characterized by very large trading volume, stock-exchange trading is important in that it enhances transparency in pricing—the Tokyo Stock Exchange closing prices serve as a public pricing source for JGBs. Long-term government bonds account for the largest share of secondary-market trading of government securities, partly because they have higher credit ratings and greater marketability than shorter maturity JGBs. In the secondary market, the broker and investor negotiate the “invoice price,” which includes commissions for the agent.

The secondary market for JGBs has some unusual features. The first relates to the benchmark or bellwether bond issue. In the U.S. Treasury market, the on-the-run issue (that is, the most recently auctioned issue for a given maturity) is the benchmark issue for each maturity. However, the Japanese benchmark issue is determined through an informal process that occurs over a few weeks. Benchmark issue characteristics are as follows: (1) a coupon that is near the prevailing rate, (2) a large outstanding amount (approximately ¥ 1.5 trillion or more), (3) a wide distribution or placement after its issue, and (4) remaining maturity that is very close to 10 years.

Another unusual feature of the JGB market is the so-called reverse coupon effect. In most bond markets, high-coupon bonds trade at a higher yield than low-coupon bonds of the same duration. This “coupon effect,” which varies with the duration of the bond as well as over time, is often attributed to such institutional factors as different taxation of capital gains and ordinary income. In Japan, however, there is a strong preference for high-coupon bonds. As a result, high-coupon bonds trade at lower yields than low-coupon bonds for the same duration (the “reverse coupon effect”). This effect occurs in spite of the Japanese tax code that requires income tax to be paid on coupon income but generally not on capital gains on Japanese government bonds. Banks prefer coupon interest because banks’ current income ratios are closely monitored by Japanese bank regulators.

## Market Participants

### *Sell Side*

JGBs are issued through a syndicate consisting of domestic (Japanese) banks, life insurance companies, other domestic financial institutions, and some foreign securities firms.

### *Buy Side*

A wide range of domestic and foreign investors use JGBs for investing, hedging, and speculation. Japanese financial institutions, particularly city, long-term credit, regional banks and insurance companies, tend to be the largest investors in yen-denominated bonds, although corporate and individual investors are very active investors in the medium-term government bond market. Foreign investors, such as U.S. commercial banks, securities firms, insurance companies, and money managers, are also active in the Japanese government bond market.

## MARKET TRANSPARENCY

Price transparency is relatively high for JGBs. JGBs are actively traded and pricing information is available from a variety of price information services, including Reuters and Telerate.

## PRICING

JGB prices are quoted in yield, specifically on the basis of simple yield, in basis points. Market price is calculated from simple yield. The following formulas are used to calculate price and yield:

$$Y_s = [C + (100 - P / T) / P, \text{ or} \\ P = [(C * T) + 100] / [1 + (T * Y_s)],$$

where

$Y_s$  = simple yield

$C$  = coupon stated in decimal form

$P$  = price

$T$  = time to maturity = number of days to maturity/365

## Discount Bonds

Discount bonds are quoted on a simple-yield basis, which is different from the simple yield used on coupon bonds. Simple yield is used for discount bonds with a maturity of less than one year, but the formula is adjusted to reflect the fact that discount bonds do not pay interest. Annually compounded yield is used for discount bonds with a maturity greater than one year.

The yield on a discount bond with less than one year remaining to maturity is the value of  $Y_s$  that solves—

$$P = 100 / (1 + T + Y_s).$$

The yield on a discount bond with more than one year remaining to maturity is the value of  $Y_m$  that solves—

$$P = 100 / (1 + Y_m)t,$$

where  $t$  is the number of days to maturity (excluding leap days) divided by 365.

## HEDGING

Because of the multiple risks associated with positions in foreign government bonds, investors may need to hedge one position in several markets using various instruments. Interest-rate risk related to JGBs is typically hedged by taking contra positions in other government bonds or by investing in interest-rate forwards, futures, options, or swaps. Similarly, foreign-exchange risk can be reduced by using currency forwards, futures, options, or swaps.

## RISKS

### Liquidity Risk

The market for longer-term JGBs tends to be more liquid than for the shorter-term issues, although liquidity has improved for the shorter-term issues in the past few years. The benchmark 10-year JGB still accounts for the majority of trading volume in the secondary market and therefore enjoys the best liquidity. More recently issued JGBs also tend to be more liquid than older issues. The market for medium-term bonds

is less liquid because such bonds are typically purchased by individuals and investment trust funds, which tend to be buy-and-hold investors. The existence of a large and active JGB futures market enhances the liquidity of these issues.

### Interest-Rate Risk

Like all bonds, the price of JGBs will change in the opposite direction from a change in interest rates. If an investor has to sell a bond before the maturity date, an increase in interest rates will mean the realization of a capital loss (selling the bond below the purchase price). This risk is by far the major risk faced by an investor in the bond market. Interest-rate risk tends to be greater for longer-term issues than for shorter-term issues. Therefore, a large concentration of long-term maturities may subject a bank's investment portfolio to unwarranted interest-rate risk.

### Foreign-Exchange Risk

A non-dollar-denominated bond (a bond whose payments are made in a foreign currency) has unknown U.S. dollar cash flows. The dollar-equivalent cash flows depend on the exchange rate at the time the payments are received. For example, a U.S. bank that purchases a 10-year JGB receives interest payments in Japanese yen. If the yen depreciates relative to the U.S. dollar, fewer dollars will be received than would have been received if there had been no depreciation. Alternatively, if the yen appreciates relative to the U.S. dollar, the investor will benefit by receiving more dollars than otherwise. Over the last few years, volatility in the U.S.-Japanese exchange rate has been particularly high, primarily due to the Japanese banking crisis.

### Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

## ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by SFAS 115, "Accounting for Certain Investments in Debt and Equity Securities," as amended by SFAS 125, "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." See section 2120.1, "Accounting," for further discussion.

## RISK-BASED CAPITAL WEIGHTING

Japanese government bonds and yields are assigned to the 0 percent risk-weight category.

## LEGAL LIMITS FOR BANK INVESTMENT

Japanese government bonds and notes are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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### GENERAL DESCRIPTION

The Spanish Treasury issues medium- and long-term bonds, Bonos del Estado (Bonos) and Obligaciones del Estado (Obligaciones), which are guaranteed by the Spanish government. Since 1987, these bonds have been issued in book-entry form only.

### CHARACTERISTICS AND FEATURES

Bonos are issued with maturities of three or five years, while Obligaciones are issued with maturities of 10 or 15 years. Both types of bonds are issued in denominations of 10,000 pesetas (pta). Bonos and Obligaciones are noncallable with bullet maturities and can be issued with either annual or semi-annual coupons. All Spanish government bonds bear a fixed coupon. Domestic settlement takes place the market date after the trade date (T+1), while international settlement takes place seven calendar days following the trade date (T+7). Settlement is done on a delivery-against-payment basis for all transactions between interbank market participants. Bonos and Obligaciones are also eligible for settlement through Euroclear and Cedel. Interest is calculated using an actual/365-day count.

### USES

Historically, Bonos and Obligaciones have been used as medium- and long-term investments. However, in the early 1990s, the trading volume of these bonds doubled as banks and corporations began to use Bonos and Obligaciones for cash-management purposes. These securities can also be used for hedging and speculative purposes.

### DESCRIPTION OF MARKETPLACE

#### Issuing Practices

Currently, all Bonos and Obligaciones are issued through monthly competitive auctions. The Span-

ish Treasury publishes the auction calendar at the beginning of the year. On the first Tuesday of the month, the 3- and 10-year bonds are issued. The 5- and 15-year bonds are issued on the following Wednesday. Each issue is sold in at least three competitive tenders. Bids are submitted before 10:30 a.m. on the auction date. Auction results are announced at 11:30 a.m. on the same day on Reuters page BANCN. Payments generally occur on the 15th of the same month.

At the beginning of each issue, the Treasury fixes the coupon to be paid for at least the next three auctions. After all bids are made, the Treasury fixes the total issue amount and allocates bids from the highest price to a cut-off price. The total issue amount is not disclosed. The lowest bid submitted is referred to as the marginal price of the issue. Bids between the average and the marginal price are filled at the price the bidders submitted. Bids above the average are filled at the average price bid.

If the Treasury announces a target issuance level and the volume awarded during the initial bidding stage is equal to or higher than 70 percent of the target level—but does not reach the target issuance level—the Treasury has the right, but not the obligation, to hold a second auction exclusively with the primary dealers. In this case, every primary dealer must submit bids for an amount at least equal to—

*(target issuance level – the volume awarded) / the number of primary dealers.*

If the target issuance level is met with the first bidding stage or if the Treasury does not announce a target issuance level, primary dealers may submit up to three additional bids. These bids cannot have yields higher than the average yield during the first bidding stage. In this scenario, the Treasury must accept bids equal to at least 10 percent of the volume awarded during the first bidding stage if it had accepted more than 50 percent of the bids. If it had accepted less than 50 percent of the bids, the Treasury must accept bids equal to at least 20 percent of the volume awarded during the first bidding stage.

Interest begins to accrue from a date nominated by the Treasury. Historically, the date has been set so that the first coupon period will

be exactly one year. Thus, tranches issued before the nominated date have an irregular period during which they trade at a discount without accrued interest.

## Secondary Market

About 40 percent of all transactions are executed through a system of interdealer brokers (blind brokers) instituted by the Bank of Spain. In the secondary market, only entities designated as "primary dealers" can deal directly with the Bank of Spain. For example, if a customer wants to buy a bond that a dealer does not have in inventory, a primary dealer can go to the Bank of Spain to obtain the bond. Nonprimary dealers would have to obtain the bonds through interdealer trading. Interdealer trading is executed through information screens. Amounts and prices are quoted, but counterparties are not disclosed.

Competitive tenders must be at least pta 50 million in the interbank market and pta 100 million in the blind-broker system. Trading volume in the secondary market varies between pta 500 million and pta 1 billion. Trading hours are between 9:00 a.m. to 5:00 p.m. local time through blind brokers, and at any hour through regular brokers.

## Market Participants

### *Sell Side*

As noted above, the dealers of government securities are classified as either primary dealers or nonprimary dealers. The Bank of Spain designates primary dealers with whom they will conduct business. Other dealers obtain government securities through interdealer trading.

### *Buy Side*

The primary holders of Bonos and Obligaciones are private and savings banks. The Bank of Spain, corporations, and foreign investors, including U.S. commercial banks, securities

firms, insurance companies, and money managers also hold outstanding bonds.

## MARKET TRANSPARENCY

Several information vendors disseminate price information on Spanish government bonds. Reuters and Telerate provide pricing information for Bonos and Obligaciones. A Telerate service called "38494" provides the latest auction information. Reuters carries bond prices, dealer prices, the latest auction results, and Spanish Treasury pages.

## PRICING

Bonos and Obligaciones are quoted on a percentage of par basis in eighths. Bid/offer spreads are typically 5 to 10 basis points for actively traded issues and about 20 basis points for illiquid issues. Bonos and Obligaciones do not trade ex-dividend, but they do trade before the Treasury nominates a date to begin coupon accruals. The period before the nomination date is referred to as the *irregular period*. Because there is no accrued interest until a coupon payment date is nominated by the Treasury, issues outstanding before the nomination are priced at a discount and adjustments to yield must be made accordingly. The following price/yield relationship holds during the irregular period:

$$PV_0 = PV_1 / (1 + y)^{(n/365)},$$

where

$PV_1$  = standard price/yield on the nominated date

$y$  = annual internal rate of return

$n$  = the number of days until the end of the irregular period

## HEDGING

Foreign-currency and interest-rate risk may be hedged by using derivative instruments such as forwards, futures, swaps, or options. Interest-rate risk may also be hedged by taking an offsetting position in another Spanish fixed-income security.

## RISKS

### Liquidity Risk

Liquidity risk is increased when market volumes of a security are low. In the case of Bonos and Obligaciones, market volumes have been volatile as investor objectives and strategies change, for example, when banks and corporations began to use Bonos and Obligaciones as cash-management instruments rather than as medium-term investments. Therefore, these bonds may experience varying levels of liquidity. Liquidity may also be a function of how close to maturity a bond issue is. In other words, more recently issued bonds tend to be more liquid than bonds that have been traded in the market for a longer period of time.

### Interest-Rate Risk

Interest-rate risk is derived from price fluctuations caused by changes in interest rates. Longer-term issues have more price volatility than shorter-term issues. A large concentration of long-term maturities may subject a bank's investment portfolio to greater interest-rate risk.

### Foreign-Currency Risk

From the perspective of an international investor, the total return from investing in Spanish government securities is partly dependent on the exchange rate between the U.S. dollar and the Spanish peseta. Several factors affect the volatility of a foreign-exchange rate including the following: the country's balance of payments and prospective changes in that balance; inflation and interest-rate differentials between countries; the social and political environment; relative changes in the money supply; and central bank intervention in the currency.

### Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an

adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

## ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by SFAS 115, "Accounting for Certain Investments in Debt and Equity Securities," as amended by SFAS 125, "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." See section 2120.1, "Accounting," for further discussion.

## RISK-BASED CAPITAL WEIGHTING

Spanish government bonds are assigned to the 0 percent risk-weight category.

## LEGAL LIMITS FOR BANK INVESTMENT

Spanish government bonds are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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- Fabozzi, Frank J. *Bond Markets, Analysis, and Strategies*. 3d ed. Upper Saddle River, N.J.: Prentice-Hall, 1996.
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### GENERAL DESCRIPTION

Swiss government notes (SGNs) and bonds (SGBs), also known as confederation notes and bonds, are fully guaranteed debt obligations of the Swiss government. The Swiss government debt market has historically been relatively small as a result of the country's low level of debt and its balanced-budget policy. The Swiss government does not engage in open market operations because of the high degree of liquidity in the banking system. However, budget deficits in recent years have resulted in an increase in the volume of activity. Bonds and notes are issued through the Swiss National Bank in bearer form only.

### CHARACTERISTICS AND FEATURES

Bonds have average maturity ranges of 7 to 20 years and are issued in denominations of Swiss franc (SFr) 1,000, SFr 5,000, and SFr 100,000. Notes have average maturities of three to seven years and are issued in denominations of SFr 50,000 and SFr 100,000. Both bonds and notes are fixed-coupon securities redeemable at par (bullets). Interest is paid annually and there are no odd first coupons. Most issues are callable, but many recent issues do not have a call feature. Settlement is based on Euroclear conventions, three days after the trade date (T+3). Interest is calculated using the 30E+/360-day-count convention; if a starting date is the 31st, it is changed to the 30th, and an end date that falls on the 31st is changed to the 1st.

### USES

Swiss government bonds and notes are used for investment, hedging, and speculative purposes. Foreign investors, including U.S. banks, often purchase Swiss government securities as a means of diversifying their securities portfolios. The low credit risk and liquidity of Swiss government bonds encourage their use. Swiss government securities may also be used to hedge an investor's exposure to Swiss interest rates or

currency risk that is related to its positions in Swiss francs. Speculators may use Swiss government bonds to take positions on changes in the level and term structure of Swiss interest rates or on changes in the foreign-exchange rates between Switzerland and the United States.

### DESCRIPTION OF MARKETPLACE

#### Issuing Practices

The Swiss Treasury issues debt through a Dutch auction, and allocations are made to the highest bidders in descending order until the supply of securities the Treasury wishes to sell is depleted. The lowest accepted tender price is considered the clearing price. The debt issuance calendar is announced at the beginning of each year. Currently, issuance takes place on the fourth Thursday of every second month.

#### Secondary Market

SGBs are listed on the Swiss stock exchanges in Zurich, Geneva, and Basle, as well as on the over-the-counter (OTC) market. SGNs are traded over the counter only.

#### Market Participants

##### *Sell Side*

The main dealers of SGBs are the Union Bank of Switzerland, Credit Suisse, and the Swiss Bank Corporation. The Swiss National Bank does not allow non-Swiss banks to underwrite or manage issues.

##### *Buy Side*

Many investors, foreign and domestic, are attracted to the Swiss bond market because of the strength of the Swiss economy, the country's low inflation rates, and the stability of its political environment and currency, all of which contribute to a stable and low-risk

government bond market. Investors include banks, securities firms, insurance companies, and money managers.

## Market Transparency

The market of SGBs and SGNs is fairly active. Price transparency is relatively high for Swiss government securities since several information vendors, including Reuters and Telerate, disseminate prices to the investing public.

## PRICING

Notes and bonds are quoted as a percentage of par to two decimals. For example, a quote of 98.16 would mean a price that is 98.16 percent of par value. The price quoted does not include accrued interest. Notes and bonds do not trade ex-dividend.

## HEDGING

Interest-rate risk may be hedged by taking contra positions in other government securities or by using interest-rate swaps, forwards, options, or futures. Foreign-exchange risk can be hedged by using currency swaps, forwards, futures, or options.

## RISKS

### Liquidity Risk

The market for SGBs is more liquid than SGNs due to a lower number of SGN issues. Bonds typically trade in a liquid market for the first few months after they are issued. However, after a few months on the secondary market, liquidity tends to decrease as a result of the fact that issue size is relatively small. In addition, liquidity is hampered by buy-and-hold investment practices and by federal and cantonal taxes levied on secondary transactions.

### Interest-Rate Risk

SGBs and SGNs are subject to interest-rate risk as a result of the inverse relationship between

bond prices and interest rates. Longer-term issues have more price volatility than short-term instruments. However, the Swiss capital market is characterized by relatively low and stable interest rates.

## Foreign-Exchange Risk

Currency fluctuations may affect the bond's yield as well as the value of coupons and principal paid in U.S. dollars. The Swiss franc is one of the strongest currencies in the world as a result of the strength of the Swiss economy and the excess liquidity in the banking system. Volatility of Swiss foreign-exchange rates has historically been low.

## Political Risk

A change in the political environment, withholding tax laws, or market regulations can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

## ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by SFAS 115, "Accounting for Certain Investments in Debt and Equity Securities," as amended by SFAS 125, "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." See section 2120.1, "Accounting," for further discussion.

## RISK-BASED CAPITAL WEIGHTING

Swiss government notes and bonds are assigned to the 0 percent risk-weight category.

## LEGAL LIMITS FOR BANK INVESTMENT

Swiss government notes and bonds are type III securities. As such, a bank's investment in them

is limited to 10 percent of its equity capital and reserves.

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### GENERAL DESCRIPTION

United Kingdom government bonds, known as “gilts” or “gilt-edged stocks,” are Sterling-denominated bonds issued by the Bank of England (BOE) on behalf of the Treasury. The bonds are unconditionally guaranteed by the U.K. government and, therefore, are considered to have very low credit risk. Shorts are those gilts having 0 to 5 years remaining to maturity; mediums, 5 to 15 years; and longs, over 15 years. The securities are generally held in registered form in the domestic settlement system. The securities can also be held via Euroclear and Cedel.

### CHARACTERISTICS AND FEATURES

Gilts come in a variety of structures. Conventional gilts or “straights” are noncallable bullet issues that pay interest semiannually. These bonds comprise around 80 percent of the outstanding gilt-edged securities. The government also issues callable gilts, so called “double-dated” gilts, which may be called at the government’s discretion anytime after the designated call date. In addition to these bonds, a number of nonconventional gilt issues are considered to be of minor importance because of their insignificant issue sizes and lack of liquidity. Such nonconventional issues include convertible gilts (in which short-dated bonds may be converted to longer-dated bonds), index-linked gilts, and irredeemable gilts (consols). Most gilt issues pay a fixed coupon. Floating-rate gilts, first issued in March 1994, have coupon payments linked to the London Interbank Bid Rate (LIBID). Unlike fixed-rate gilts, interest on floating-rate gilts is paid quarterly to investors.

Settlement in the gilt market is usually done on the market date following the trade date (T+1), although two-day and seven-day settlements are also fairly common. Deals are normally cleared through the Bank of England’s Central Gilt Office (CGO). The CGO is linked to Euroclear and Cedel. Interest is calculated using an actual/365-day count.

### USES

Gilts are used for investment, hedging, and speculative purposes by domestic and foreign entities. While foreign investors may buy gilts as a means of diversifying their investment portfolios, gilts may also be used to hedge positions that are sensitive to movements in U.K. interest rates or foreign-exchange rates. Speculators, on the other hand, may use long-term bonds to take positions on changes in the level and term structure of interest rates.

### DESCRIPTION OF MARKETPLACE

#### Issuing Practices

The BOE issues a debt management report in March of each year, which lays out gilt-issuance plans for the fiscal year running from April to March. The report represents the Treasury’s forecast of the gilts that need to be sold and also details the percentage of issuance expected to fall into each area of the maturity spectrum. Complete details of the auction, including the amount and terms of gilt to be auctioned and other information, are announced eight days before the auction. Gilt-edged market makers (GEMMs) quote prices on a when-issued basis. Deals cannot be settled until the business day after the auction when trading in the newly issued bonds officially begins. The existence of a shadow market, however, ensures that the market can trade to a level where new bonds will be easily absorbed, limiting the chances of a surplus inventory of bonds.

During the auction process, bids are accepted on a competitive and a noncompetitive basis. Competitive bids are for a minimum of £500,000 and can be made at any price. Bids are accepted going from the highest price to the lowest price until the bank exhausts the amount of securities it wants to sell. If the issue size is not large enough to satisfy demand at the lowest accepted price, bidders get a proportion of their requests. In such a bid, the BOE cannot give more than 25 percent of the amount offered to any one bidder. Noncompetitive bids vary between £1,000 and £500,000 per bidder. Bonds are allocated to noncompetitive bidders at a price

equal to that of the weighted average of bids filled in the competitive auction.

The BOE also sells a fixed amount of securities at a fixed price (tap form). This form of issuance allows the BOE to respond to market demand and add liquidity to the market. More specifically, tap issues are normally done from the supply of bonds that have not been sold at an auction. Typically, bonds are held back with the intent to sell them when demand has improved or when there is an increased need for funds. In a tap issuance, stock is issued to GEMMs in the form of “tranches,” typically up to £500 million.

Payment for gilts may be made in full or in part. In a partly paid auction, competitive bidders are required to deposit a portion of the amount bid, with the rest due after issue as specified in the prospectus. In a partly paid auction, the first coupon payment and the market price reflect the partly paid status of the gilt. After the installments are cleared as per the prospectus, the partly paid distinction disappears.

## Secondary Market

U.K. gilts are traded on the London Stock Exchange, International Stock Exchange, and London International Financial Futures Exchange (LIFFE). Gilts can be traded 24 hours a day. Generally, gilts are traded on the International Stock Exchange between the hours of 9 a.m. and 5 p.m. and on the LIFFE between the hours of 8:30 a.m. and 4:15 p.m. and between 4:30 p.m. and 6:00 p.m. The typical transaction size in the secondary market varies between £5 to £100 million.

## Market Participants

### *Sell Side*

The primary dealers of U.K. government bonds are known as gilt-edged market makers or GEMMs. GEMMs quote the exact size, amount, and terms of the issuance beginning eight days before an auction, thereby creating a “shadow market.” At this time, they quote prices on a when-issued basis.

### *Buy Side*

A wide range of investors use U.K. government bonds for investing, hedging and speculation. This includes banks, nonfinancial corporate and quasi-corporate public and private enterprises, pension funds, charities, pension arms of life insurance companies, and private investors. The largest holders of gilts are domestic entities, but foreign investors, including U.S. banks, are also active participants in the market.

## Market Transparency

The gilt market is active and price transparency is relatively high for these securities. Several information vendors disseminate prices to the investing public, including Reuters.

## PRICING

Prices are quoted as a percent of par in 32nds. For example, a price of 98:16 means that the price of the bond is 98.5 percent of par value (98 16/32). Prices are quoted on a clean-price basis, net of accrued interest. The settlement price takes accrued interest into account so that the total price equals the clean price plus or minus the accrued interest. The bid/offer spreads tend to be extremely thin. For liquid issues with a maturity of up to seven years, the spread is normally 1/16 or less; for liquid issues with longer maturities, the spread is normally 1/16 to 1/8.

## HEDGING

U.K. gilts may be hedged for foreign-exchange risk using foreign-exchange options, forwards, and futures. These securities can be hedged for interest-rate risk by taking a contra position in another gilt or by using derivative instruments such as forwards, swaps, futures, or options. Currently, the LIFFE gilt futures contract is the most heavily traded hedging instrument. The effectiveness of a particular hedge depends on the yield curve and basis risk. For example, hedging a position in a six-year note with an over-hedged position in a two-year bill may expose the dealer to yield curve risk. Hedging a 30-year bond with a bond future exposes the

dealer to basis risk if the historical price relationships between futures and cash markets are not stable.

## RISKS

### Liquidity Risk

Gilts trade in an active and liquid market. Liquidity in the market is ensured by the BOE, which is responsible for maintaining the liquidity and efficiency of the market and, in turn, supervises the primary dealers of gilts. GEMMs, who act as primary dealers, are required to quote two-way prices at all times. An increase in foreign investment activity in the gilt market has led to a substantial increase in competition and enhanced liquidity.

Liquidity is also enhanced through the BOE's ability to reopen auctions and tap issues. The ability to reopen issues improves liquidity and avoids the unfavorable pricing that may occur when the market is flooded with one very large issue. A tap issue, as explained above, allows the BOE to relieve market shortage of a particular bond. An active repo market allows market makers (GEMMs) to fund their short positions, and it improves turnover in the cash market, attracting international players familiar with the instrument, which further improves liquidity.

### Interest-Rate Risk

U.K. gilts are subject to price fluctuations due to changes in interest rates. Longer-term issues have more price volatility than shorter-term instruments. Therefore, a large concentration of longer-term maturities may subject a bank's investment portfolio to unwarranted interest-rate risk. The BOE will introduce an official U.K. gilt-stripping facility in early 1997. At the moment, the longest duration available on the conventional gilt is 10 years. However, the longest strip will have a 19-year duration. The stripping facility will enable banks to reduce interest-rate risk in their long-term investment portfolios.

### Foreign-Exchange Risk

Currency movements have the potential to affect returns of fixed-income investments whose

interest and principal are paid in foreign currencies. The devaluation of a foreign currency relative to the U.S. dollar would not only affect a bond's yield, but would affect bond pay-offs in U.S. dollar terms. Some factors that may affect the U.K. foreign-exchange rate include—

- wider exchange-rate mechanism bands, which increase the risk of holding high-yielding currencies;
- central bank intervention in the currency markets;
- speculation about the European economic and monetary union and its potential membership, which puts European currencies under pressure vis-à-vis the deutschemark; and
- endemic inflation in the United Kingdom.

### Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

## ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by SFAS 115, "Accounting for Certain Investments in Debt and Equity Securities," as amended by SFAS 125, "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." See section 2120.1, "Accounting," for further discussion.

### RISK-BASED CAPITAL WEIGHTING

United Kingdom government bonds are assigned to the 0 percent risk-weight category.

### LEGAL LIMITS FOR BANK INVESTMENT

United Kingdom government bonds are type III securities. As such, a bank's investment in them

is limited to 10 percent of its equity capital and reserves.

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### GENERAL DESCRIPTION

In 1989, the Brady plan, named after then-U.S. Treasury Secretary Nicholas Brady, was announced to restructure much of the debt of developing countries that was not being fully serviced due to economic constraints. The plan provided debt relief to troubled countries and, in theory, opened access to further international financing. It also provided the legal framework to securitize and restructure the existing bank debt of developing countries into bearer bonds. Linking collateral to some bonds gave banks the incentive to cooperate with the debt reduction plan.

Brady bonds are restructured bank loans. They comprise the most liquid market for below-investment-grade debt (though a few Brady countries have received investment-grade debt ratings) and are one of the largest debt markets of any kind. Banks are active participants in the Brady bond market. Once strictly an interbank market, the Brady market has evolved into one with active participation from a broad investor base.

### CHARACTERISTICS AND FEATURES

Brady bonds have long-term maturities, and many have special features attached. Callable bonds or step-up coupons are among the most common features. Others pay additional sources of income based on various economic factors or the price of oil. Listed below are the individual characteristics of several types of Brady bonds:

- *Par bonds* have fixed coupons or coupon schedules and bullet maturities of 25 to 30 years. Typically, these bonds have principal-payment and rolling interest-rate guarantees. Because pars are loans exchanged at face value for bonds, debt relief is provided by a lower interest payment.
- *Discount bonds* have floating-rate coupons typically linked to LIBOR. These bonds have principal and rolling interest-rate guarantees. Bond holders receive a reduced face amount of discount bonds, thereby providing debt relief.

- *Front-loaded interest-reduction bonds* provide a temporary interest-rate reduction. These bonds have a low fixed-interest rate for a few years and then step up to market rates until maturity.
- *Debt conversion bonds (DCBs) and new money bonds* are exchanged for bonds at par and yield a market rate. Typically, DCBs and new money bonds pay LIBOR + 7/8. These bonds are amortized and have an average life of between 10 and 15 years. DCBs and new money bonds are structured to give banks an incentive to inject additional capital. For each dollar of new money bond purchased, an investor converts existing debt into a new money bond at a fixed proportion determined by the Brady agreement. DCBs and new money bonds are normally uncollateralized.

The terms of local debt market instruments also vary widely, and issues are denominated in either local or foreign currency such as U.S. dollars. Brief descriptions of instruments in Argentina, Brazil, and Mexico follow.

#### Argentina

Letes are Argentine Treasury bills. They are offered on a discount basis and have maturities of 3, 6, and 12 months. Auctions are held on a monthly basis.

#### Brazil

Currently, the primary internal debt instruments issued in Brazil are so-called BBC bonds, which are issued by the central bank. As of mid-1996, BBC bonds were being issued in 56-day denominations, up from 35-, 42-, and 49-day denominations. Total outstandings as of June 30, 1996, were U.S.\$49.9 billion, and these instruments are highly liquid. The central bank also issues bills and notes known as LTNs and NTNs that have maturities up to one year (though one NTN has been issued as of this writing with a two-year maturity). LTNs and NTNs are less liquid and have smaller outstandings (U.S.\$34.4 and U.S.\$18.2 billion, respectively) than BBC bonds.

## Mexico

### *Ajustabonos*

Though issuance of these bonds has been halted, ajustabonos are peso-denominated Treasury bonds. They are indexed to inflation and pay a real return over the Mexican consumer price index (CPI). These bonds are longer-term instruments with maturities of 1,092 days (three years) and 1,820 days (five years). Ajustabonos pay a quarterly real rate coupon over the CPI and are tax exempt to foreign investors. As of May 1996, U.S.\$5.6 billion ajustabonos remained outstanding.

### *Bondes*

Bondes are floating-rate, peso-denominated government development bonds. They have maturities of 364 and 728 days. Bondes pay interest every 28 days at the higher of the 28-day cetes rate or the retail pagares rate, calculated by the central bank. They are auctioned weekly and are tax exempt to foreign investors. The total amount outstanding as of mid-1996 was approximately U.S.\$5 billion.

### *Cetes*

Cetes are government securities and are the equivalent of Mexican T-bills. They are denominated in pesos and are sold at a discount. Cetes have maturities of 28, 91, 182, 364, and 728 days (though this maturity is presently discontinued). Cetes are highly liquid instruments and have an active repo market.

The capital gain for these instruments is determined by the difference between the amortized value and the purchase price; the day-count convention is actual/360-day. Auctions are held weekly by the central bank for the 28-through 364-day maturities. Foreign investors are exempted from paying taxes on these instruments.

### *Tesobonos*

Though these instruments are not currently being issued, they comprised the majority of debt offerings in the time leading up to the 1994 peso crisis. Tesobonos are dollar-indexed govern-

ment securities with a face value of U.S.\$1,000. At the investors' option, they are payable in dollars, and they are issued at a discount. Maturities include 28, 91, 182, and 364 days.

### *UDIBonos*

During the week of May 27, 1996, the Mexican central bank sold three-year UDIBonos for the first time. They are inflation-adjusted bonds denominated in accounting units or UDIs (a daily inflation index), which change in value every day. These instruments replaced the ajustabonos. UDIBonos pays interest semiannually and offer holders a rate of return above the inflation rate. They are auctioned biweekly and may have limited liquidity.

## USES

Brady bonds and local debt market instruments can be used for investment, hedging, and speculation. Speculators will often take positions on the level and term structure of sovereign interest rates. Arbitragers will take positions based on their determination of mispricing.

## DESCRIPTION OF MARKETPLACE

### Issuing Practices

A Brady deal exchanges dollar-denominated loans for an agreed-upon financial instrument. These instruments include various debt instruments, debt equity swaps, and asset swaps. At the close of a collateralized Brady deal (not all Brady bonds are collateralized), collateral is primarily posted in the form of U.S. Treasury zero-coupon bonds and U.S. Treasury bills. The market value of this collateral depends on the yield of 30-year U.S. Treasury strips and tends to increase as the bond ages. Developing countries have also used their own resources for collateral as well as funds from international donors, the World Bank, and the International Monetary Fund (IMF) to support their Brady deals. Local debt instruments are subject to the issuing practices of each individual country.

## Market Participants

The number of market participants in each emerging market differs with the characteristics of each market, such as regulatory barriers, liquidity constraints, and risk exposures. However, there are many participants in the Brady bond market. Securitization of Brady bonds enables banks to diversify and transfer some of their country exposures to other banks. New market participants in the Brady market include investment banks as well as traditional commercial banks, mutual funds, pension funds, hedge funds, insurance companies, and some retail investors.

## Market Transparency

For many instruments, prices are available on standard quote systems such as Bloomberg, Reuters, and Telerate. In addition, many brokers can quote prices on LDC debt instruments. For all but the most liquid Brady bonds and internal debt instruments, however, transparency can be very limited.

## PRICING

Pricing for the various LDC issues differs across instruments and countries. The price of a Brady bond is quoted on its spread over U.S. Treasuries. Standard bond pricing models are often used to price the uncollateralized bond and unsecured traded bank loans, with emphasis on the credit risk of the issuers (sovereign risk) in determining whether a sufficient risk premium is being paid. Most of the volatility in Brady bonds comes from movement in the spread over U.S. Treasuries.

## HEDGING

OTC options are the primary vehicles to hedge Brady bonds. Because the volume of the OTC options market is approximately one-tenth that of the cash Brady bond market, liquidity is relatively poor.

Cash instruments from the identical sovereign issuer can be used to hedge positions. However, as in other hedging situations, mismatch of terms can lead to basis risk.

Hedging strategies for Brady bonds are often focused on decomposing the sovereign risk from the U.S. rate risk and on neutralizing the latter. For example, a long fixed-coupon Brady bond position is exposed to the risk that U.S. rates will rise and Brady prices will fall. A hedge aimed at immunizing U.S. rate risk can be established with a short U.S. Treasury, Treasury futures, or forward position.

## RISKS

### Sovereign Risk

One of the most significant risks related to trading of LDC debt is sovereign risk. This includes political, regulatory, economic stability, tax, legal, convertibility, and other forms of risks associated with the country of issuance. Real risk is that of potential controls or taxes on foreign investment. While there is no way to predict policy shifts, it can help to be familiar with any current controls and to closely follow the trend of inflation.

### Liquidity Risk

Liquidity risk is the risk that a party may not be able to unwind its position. In emerging markets, liquidity risk can be significant. During the Mexican peso crisis, bids on various instruments were nonexistent. Portfolio values of Latin American instruments plunged. In the OTC market, options are far less liquid than cash bonds. As a result, option positions are often held to expiry rather than traded.

### Interest-Rate Risk

Debt issues of various countries are subject to price fluctuations because of changes in sovereign risk premium in addition to changes in market interest rates and changes in the shape of the yield curve. Spreads between U.S. rates and sovereign rates capture this sovereign risk premium. In general, the greater the uncertainty of future payoffs, the greater the spread between country rates and U.S. rates. This spread will not necessarily be stable, however, making interest-rate risk *at least* equivalent to that found in U.S. Treasury instruments.

## ACCOUNTING TREATMENT

Less-developed-country debt that remains in the form of a loan and does not meet the definition of a security in SFAS 115 should be reported and accounted for as a loan. If the loan was restructured in a troubled debt restructuring involving a modification of terms, and the restructured loan meets the definition of a security in SFAS 115, then the instrument should be accounted for according to the provisions of SFAS 115 (FASB Technical Bulletin No. 94-1).

The accounting treatment for investments in foreign debt is determined by SFAS 115, "Accounting for Certain Investments in Debt and Equity Securities," as amended by SFAS 125, "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." See section 2120.1, "Accounting," for further discussion.

## RISK-BASED CAPITAL WEIGHTING

Claims that are directly and unconditionally guaranteed by an OECD-based central government or a U.S. government agency are assigned to the zero percent risk category. Claims that are not unconditionally guaranteed are assigned to the 20 percent risk category. A claim is not considered to be unconditionally guaranteed by a central government if the validity of the guarantee depends on some affirmative action by the holder or a third party. Generally, securities guaranteed by the U.S. government or its agencies and that are actively traded in financial markets are considered to be unconditionally guaranteed.

Claims on, or guaranteed by, non-OECD central governments which do *not* represent local currency claims that are unconditionally or conditionally guaranteed by non-OECD central governments to the extent that the bank has liabilities booked in that currency are assigned a 100 percent risk weight. Also, all claims on

non-OECD state or local governments are assigned to the 100 percent risk category.

## LEGAL LIMITATIONS FOR BANK INVESTMENT

Obligations which are guaranteed by a department or an agency of the U.S. government, if the obligation commits the full faith and credit of the United States for the repayment of the obligation, are type I securities and are not subject to investment limitations. Also, obligations guaranteed by the Canadian government are classified as type I securities.

Obligations guaranteed by other OECD countries which are classified as investment grade are type III securities, which limit a bank's investment to 10 percent of its capital and surplus.

Non-investment-grade LDC debt may be purchased under a bank's "reliable estimates" bucket. If a bank concludes, on the basis of reliable estimates, that an obligor will be able to perform, and the security is marketable, it can purchase the security notwithstanding its investment-grade rating. Such securities are subject to a 5 percent limit of a bank's capital and surplus for all securities purchased under this authority.

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## GENERAL DESCRIPTION

Foreign exchange (FX) refers to the various businesses involved in the purchase and sale of currencies. This market is among the largest in the world and business is conducted 24 hours a day in most of the financial centers. The major participants are financial institutions, corporations, and investment and speculative entities such as hedge funds. Any financial institution which maintains *due from* bank balances, commonly known as “nostro” accounts, in foreign countries in the local currency can engage in foreign exchange. The volume in this market has been estimated to be the equivalent of \$1 trillion a day.

## CHARACTERISTICS AND FEATURES

The FX market is divided into spot, forward, swap, and options segments. Each of these segments is discussed in the following subsections.

### Spot

Buying and selling FX at market rates for immediate delivery represents spot trading. Generally, spot trades in foreign currency have a “value date” (maturity or delivery date) of two to five business days (one day for Canada). Foreign-exchange rates that represent the current market value for the currency are known as spot rates. The risk of spot trading results from exchange-rate movements that occur while the financial institution’s position in foreign currency is not balanced with regard to the currency it has bought and sold. Such unbalanced positions are referred to as net open positions.

### *Net Open Positions*

A financial institution has a net open position in a foreign currency when its assets, including spot and forward/futures contracts to purchase, and its liabilities, including spot and forward/futures contracts to sell, in that currency are not equal. An excess of assets over liabilities is called a net “long” position, and liabilities in

excess of assets are called a net “short” position. A long position in a foreign currency which is depreciating will result in an exchange loss relative to book value because, with each day, that position (asset) is convertible into fewer units of local currency. Similarly, a short position in a foreign currency which is appreciating represents an exchange loss relative to book value because, with each day, satisfaction of that position (liability) will cost more units of local currency.

The net open position consists of both balance-sheet accounts and contingent liabilities. For most financial institutions, the nostro accounts represent the principal assets; however, foreign-currency loans as well as any other assets or liabilities that are denominated in foreign currency, which are sizeable in certain financial institutions, must be included. All forward/futures foreign-exchange contracts outstanding are contingents. When a contract matures, the entries are posted to a nostro account in the appropriate currency.

Each time a financial institution enters into a spot foreign-exchange contract, its net open position is changed. For example, assume that Bank A opens its business day with a balanced net open position in pound sterling (assets plus purchased contracts equal liabilities plus sold contracts). This is often referred to as a “flat” position. Bank A then receives a telephone call from Bank B requesting a “market” in sterling. Because it is a participant in the interbank foreign-exchange trading market, Bank A is a “market maker.” This means it will provide Bank B with a two-sided quote consisting of its bid and offer for sterling. If a different currency was requested, European terms would be the opposite since the bid and offer would be for dollars instead of the foreign currency. In determining the market given, Bank A’s trader of sterling will determine where the market is presently (from brokers and/or other financial institutions), attempt to anticipate where it is headed, and determine whether Bank B is planning to buy or sell sterling.

### Forward Transactions

A forward transaction differs from a spot transaction in that the value date is more than two to

five business days in the future. The maturity of a forward foreign-exchange contract can be a few days, months, or even years in some instances. In practice, dates that are two years or more in the future are usually referred to as the long-dated forward market or the long-term FX (LTFX) market. The exchange rate is fixed at the time the transaction is agreed on. However, nostro accounts are not debited or credited, that is, no money actually changes hands, until the maturity date of the contract. There will be a specific exchange rate for each forward maturity, and each of those rates will generally differ from today's spot exchange rate. If the forward exchange rate for a currency is higher than the current spot rate, the currency is trading at a premium for that forward maturity. If the forward rate is below the spot rate, then the currency is trading at a discount. For instance, sterling with a value date of three months is at a discount if the spot rate is \$1.75 and the three-month forward rate is \$1.72.

## Foreign-Exchange Swaps

Financial institutions that are active in the foreign-exchange market find that interbank outright forward currency trading is inefficient and engage in it infrequently. Instead, for future maturities, financial institutions trade among themselves as well as with some corporate customers on the basis of a transaction known as a *foreign-exchange swap*. A swap transaction is a simultaneous purchase and sale of a certain amount of foreign currency for two different value dates. The key aspect is that the financial institution arranges the swap as a single transaction with a single counterparty, either another financial institution or a nonbank customer. This means that, unlike outright spot or forward transactions, a trader does not incur a net open position since the financial institution contracts both to pay and to receive the same amount of currency at specified rates. Note that a *foreign-exchange swap* is different from a *foreign-currency swap*, because the currency swap involves the periodic exchange of interest payments. See the discussion in section 4335.1, "Currency Swaps."

A foreign-exchange swap allows each party to use a currency for a period in exchange for another currency that is not needed during that time. Thus, the swap offers a useful investment facility for temporary idle currency balances of

a corporation or a financial institution. Swaps also provide a mechanism for a financial institution to accommodate the outright forward transactions executed with customers or to bridge gaps in the maturity structure of outstanding spot and forward contracts.

The two value dates in a swap transaction can be any two dates. But, in practice, markets exist only for a limited number of standard maturities. One of these standard types is called a *spot-against-forward swap*. In a spot-against-forward swap transaction, a trader buys or sells a currency for the spot value date and simultaneously sells or buys it back for a value date a week, a month, or three months later.

Another type of transaction of particular interest to professional market-making financial institutions is called a *tomorrow-next swap* or a *rollover*. These are transactions in which the dealer buys or sells a currency for value the next business day and simultaneously sells or buys it back for value the day after. A more sophisticated type of swap is called a *forward-forward* in which the dealer buys or sells currency for one future date and sells or buys it back for another future date. Primarily, multinational banks specialize in transactions of this type.

## Options

The foreign-exchange options market includes both plain vanilla and exotic transactions. See section 4330.1, "Options," for a general discussion. Most options activity is plain vanilla.

## USES

Foreign exchange is used for investment, hedging, and speculative purposes. Most banks use it to service customers and also to trade for their own account. Corporations use the FX market mainly to hedge their foreign-exchange exposure.

## DESCRIPTION OF MARKETPLACE

### Market Participants

#### *Sell Side*

The majority of U.S. banks restrict their foreign-exchange activities to serving their customers'

foreign-currency needs. The banks will simply sell the currency at a rate slightly above the market and subsequently offset the amount and maturity of the transaction through a purchase from another correspondent bank at market rates. This level of activity involves virtually no risk exposure as currency positions are covered within minutes. For these banks, a small profit is usually generated from the rate differential, but the activity is clearly designated as a service center rather than a profit center.

Usually, the larger the financial institution, the greater the emphasis placed on foreign-exchange activity. For instance, while serving the needs of corporate customers is still a priority, most regional banks also participate in the interbank market. These banks may look at the trading function as a profit center as well as a service. Such banks usually employ several experienced traders and may take positions in foreign currencies based on anticipated rate movements. These banks use their involvement in the interbank market to get information about the various markets. For most of these participants, the trading volume in the interbank market constitutes the bulk of the volume. (In some cases, the interbank volume is about 80 to 90 percent of total volume). Multinational banks assume by far the most significant role in the foreign-exchange marketplace. While still serving customer needs, these banks engage heavily in the interbank market and look to their foreign-exchange trading operation for sizeable profits. These banks trade foreign exchange on a global basis through their international branch networks.

One of the major changes in the structure of the foreign-exchange market over the past few years has been the increase in the use of electronic market-making and execution systems. In the past, most interbank dealing was done through the interbank brokers' system; however, advances in technology have made it more efficient for market participants to use electronic systems. (Among the more popular systems are Reuters and EBS (Electronic Brokering Systems).) These developments have decreased the number of errors that are common in the use of the brokers' market (for example, the use of points and error checks) and have also cut down on the costs of doing business.

### *Buy Side*

The buy side consists of corporate hedgers,

investors, and speculators. Corporations use this market to hedge their assets and liabilities incurred as a result of their overseas operations. Investors (for example, international mutual funds) use this market to gain exposure to markets and sometimes to hedge away the currency risk of their equity portfolios.

## Market Transparency

Price transparency is very high. The prices for most of the markets are disseminated through various vendors such as Reuters and Telerate.

## PRICING

Two methods are used to quote foreign-exchange rates. The method used depends on the currency.

- *American quote.* Number of foreign-currency units per U.S. dollar (for example, 105 yen per dollar). Most currencies are quoted using this convention.
- *European quote.* Number of U.S. dollars per foreign-currency unit (for example, \$1.60 per British pound sterling). British and Irish pounds and Australian and New Zealand dollars are the most common currencies using this convention.

## Spot FX

Most institutions will quote both a bid and an offer. When, for example, Bank A quotes sterling at \$1.7115-25, it is saying that it will buy (bid) sterling at \$1.7115 or sell (offer) sterling at \$1.7125. If Bank B's interest is to buy sterling and the given quote is appealing, it will buy sterling from Bank A at \$1.7125 (Bank A's offer price). Note that while Bank B may choose to buy, sell, or pass as it wishes, it must do business on the terms established by Bank A. These terms will be in Bank A's favor. As soon as Bank B announces it will purchase sterling at \$1.7125, Bank A acquires a net open position (short) in sterling. Bank A must then decide whether to hold its short position (in anticipation of a decline in sterling) or cover its position. If it wishes to cover, it may call another bank and purchase the amount it sold to Bank B. However, as the calling bank, Bank A would buy its

sterling from the offered side of the quote it receives and must buy it at \$1.7125 or less to avoid a loss.

## Foreign-Exchange Swaps

In foreign-exchange swap transactions, the trader is only interested in the difference between spot and forward rates—the premium or discount—rather than the outright spot and forward rates themselves. Premiums and discounts expressed in points (\$0.0001 per pound sterling or DM 0.0001 per dollar) are called swap rates. If the pound spot rate is \$1.8450 and the six-month forward rate is \$1.8200, the dollar's six-month premium is 250 points (\$0.0250). If the pound spot rate is \$1.8450 and the six-month forward rate is \$1.8625, the dollar's six-month discount is 175 points (\$0.0175).

Since, in a swap transaction, a trader is effectively borrowing one currency and lending the other for the period between the two value dates, the premium or discount is often evaluated in terms of percent per annum. For the examples above, the premium of 250 points is equivalent to 2.71 percent per annum, while the discount of 175 points is equivalent to 1.90 percent per annum. To calculate the percentage premium for the first case—

- take the swap rate (\$0.0250),
- multiply by 12 months and divide by six months (a per annum basis),
- divide by the spot rate (\$1.8450), and
- multiply by 100 (to get a percent basis).

This formula can be expressed as—

$$\% \text{ per annum} = \frac{\text{Premium or Discount} * 12}{\text{Spot rate} * \text{no. of months of forward contract}} * 100$$

Forward rates (premiums or discounts) are solely influenced by the interest-rate differentials between the two countries involved. As a result, when the differential changes, forward contracts previously booked could now be covered at either a profit or loss. For example, assume an interest-rate differential between sterling and dollars of 3 percent (with the sterling rate lower). Using this formula, with a spot rate

of \$1.80, the swap rate on a three-month contract would be a premium of 135 points. If that interest-rate differential increases to 4 percent (by a drop in the sterling rate or an increase in the dollar rate), the premium would increase to 180 points. Therefore, a trader who bought sterling three months forward at 135 points premium could now sell it at 180 points premium, or at a profit of 45 points (expressed as .0045).

Thus, the dealer responsible for forward trading must be able to analyze and project dollar interest rates as well as interest rates for the currency traded. Additionally, because forward premiums or discounts are based on interest-rate differentials, they do not reflect anticipated movements in spot rates.

## HEDGING

### Spot FX

Banks engaged in trading in the spot market will acquire net open positions in the course of dealing with customers or other market makers. The bank must then decide whether to hold its open position (in anticipation of a move in the currency) or cover its position. If it wishes to cover, the bank may call another bank and either buy or sell the currency needed to close its open position.

Financial institutions engaging in interbank spot trading will often have sizeable net open positions, though many for just brief periods of time. No matter how skilled the trader, each institution will have occasional losses. Knowing when to close a position and take a small loss before it becomes large is a necessary trait for a competent trader. Many financial institutions employ a “stop-loss policy,” whereby a net open position must be covered if losses from it reach a certain level. While a trader's forecast may ultimately prove correct within a day or week, rapid rate movements often cause a loss within an hour or even minutes. Also, access to up-to-the-minute information is vital for involvement in spot trading. Financial institutions that lack the vast informational resources of the largest multinationals may be particularly vulnerable to sudden spot rate movements. As a result, examiners should closely review financial institutions in which foreign-exchange activities consist primarily of interbank spot trading.

## Forwards

Active trading financial institutions will generally have a large number of forward contracts outstanding. The portfolio of forward contracts is often called a *forward book*. Trading forward foreign exchange involves projecting interest-rate differentials and managing the forward book to be compatible with these projections.

Forward positions are generally managed on a gap basis. Normally, financial institutions will segment their forward books into 15-day periods and show the net (purchased forward contracts less sold ones) balance for each period. Volumes and net positions are usually segregated into 15-day periods for only the first three months, with the remainder grouped monthly. The trader will use the forward book to manage his or her overall forward positions.

A forward book in an actively traded currency may consist of numerous large contracts but, because of the risks in a net open position, total forward purchases will normally be approximately equal to total forward sales. What matters in reviewing a forward book is the distribution of the positions among periods. For example, if a forward book in sterling has a long net position of 3,200,000 for the first three months and is short a net 3,000,000 for the next four months, the forward book is structured anticipating a decline in dollar interest rates as compared with sterling interest rates since these sold positions could be offset (by purchase of a forward contract to negate the sold forward position) at a lower price—either through reduced premium or increased discount. See the subsection below for a discussion of the risks encountered in hedging foreign-exchange exposure.

## RISKS

### Exchange-Rate Risk

Exchange-rate (market) risk is an inevitable consequence of trading in a world in which foreign-currency values move up and down in response to shifting market supply and demand. When a financial institution's dealer buys or sells a foreign currency from another financial institution or a nonbank customer, exposure from a net open position is created. Until the time that the position can be covered by selling

or buying an equivalent amount of the same currency, the institution is exposed to the risk that the exchange rate might move against it. That risk exists even if the dealer immediately seeks to cover the position because, in a market in which exchange rates are constantly changing, a gap of just a few minutes can be long enough to transform a potentially profitable transaction into a loss. Since exchange-rate movements can consistently run in one direction, a position carried overnight or over a number of days entails greater risk than one carried a few minutes or hours.

At any time, the trading function of a financial institution may have long positions in some currencies and short positions in others. These positions do not offset each other, even though, in practice, the price changes of some currencies do tend to be correlated. Traders in institutions recognize the possibility that the currencies in which they have long positions may fall in value and the currencies in which they have short positions may rise. Consequently, gross trading exposure is measured by adding the absolute value of each currency position expressed in dollars. The individual currency positions and the gross dealing exposure must be controlled to avoid unacceptable risks.

To accomplish this, management limits the open positions dealers may take in each currency. Practices vary among financial institutions, but, at a minimum, limits are established on the magnitude of open positions which can be carried from one day to the next (overnight limits). Several institutions set separate limits on open positions dealers may take during the day. These are called "daylight limits." Formal limits on gross dealing exposure also are established by some institutions, while others review gross exposure more informally. The various limits may be administered flexibly, but the authority to approve a temporary departure from a limit is typically reserved for a senior officer.

For management and control purposes, most financial institutions distinguish between positions arising from actual foreign-exchange transactions (trading exposure) and the overall foreign-currency-translation exposure of the institution. The former includes the positions recorded by the institution's trading operations at the head office and at offices abroad. In addition to trading exposure, overall exposure incorporates all the institution's assets and liabilities denominated in foreign currencies,

including loans, investments, deposits, and the capital of foreign branches.

## Maturity Gaps and Interest-Rate Risk

Interest-rate risk arises whenever mismatches or gaps occur in the maturity structure of a financial institution's foreign-exchange forward book. Managing maturity mismatches is an exacting task for a foreign-exchange trader.

In practice, the problem of handling mismatches is complex. Eliminating maturity gaps on a contract-by-contract basis is impossible for an active trading institution. Its foreign-exchange book may include hundreds of outstanding contracts, with some maturing each business day. Since the book is changing continually as new transactions are made, the maturity gap structure also changes constantly.

While remaining alert to unusually large mismatches in maturities that call for special action, traders generally balance the net daily payments and receipts for each currency through the use of rollovers. Rollovers simplify the handling of the flow of maturing contracts and reduce the number of transactions needed to balance the book. Reliance on day-to-day swaps is a relatively sound procedure as long as interest-rate changes are gradual and the size and length of maturity gaps are controlled. However, it does leave the financial institution exposed to sudden changes in relative interest rates between the United States and other countries. These sudden changes influence market quotations for swap transactions and, consequently, the cost of bridging the maturity gaps in the foreign-exchange book.

The problem of containing interest-rate risk is familiar to major money market banks. Their business often involves borrowing short-term and lending longer-term to benefit from the normal tendency of interest rates to be higher for longer maturities. But in foreign-exchange trading, it is not just the maturity pattern of interest rates for one currency that counts. In handling maturity gaps, the differential between interest rates for two currencies is decisive, making the problem more complex.

To control interest-rate risk, senior management generally imposes limits on the magnitude of mismatches in the foreign-exchange book. Procedures vary, but separate limits are often set on a day-to-day basis for contracts maturing during the following week or two and for each consecutive half-monthly period for contracts

maturing later. At the same time, management relies on officers abroad, domestic money market experts, and its economic research department to provide ongoing analysis of interest-rate trends.

## Credit and Settlement Risk

When a financial institution books a foreign-exchange contract, it faces a risk, however small, that the counterparty will not perform according to the terms of the contract. To limit credit risk, a careful evaluation of the creditworthiness of the customer is essential. Just as no financial institution can lend unlimited amounts to a single customer, no institution would want to trade unlimited amounts of foreign exchange with one counterparty.

Credit risk arises whenever an institution's counterparty is unable or unwilling to fulfill its contractual obligations—most blatantly when a corporate customer enters bankruptcy or an institution's counterparty is declared insolvent. In any foreign-exchange transaction, each counterparty agrees to deliver a certain amount of currency to the other on a particular date. Every contract is immediately entered into the financial institution's foreign-exchange book. In balancing its trading position, a financial institution counts on that contract being carried out in accordance with the agreed-upon terms. If the contract is not liquidated, then the institution's position is unbalanced and the institution is exposed to the risk of changes in the exchange rates. To put itself in the same position it would have been in if the contract had been performed, an institution must arrange for a new transaction. The new transaction may have to be arranged at an adverse exchange rate. The trustee for a bankrupt company may perform only on contracts which are advantageous to the company and disclaim those contracts which are disadvantageous. Some dealers have attempted to forestall such arbitrary treatment through the execution of legally recognized bilateral netting agreements. Examiners should determine whether dealers have such agreements in place and whether they have a favorable legal opinion as to their effectiveness, particularly in cross-border situations.

Another form of credit and settlement risk stems from the time-zone differences between the United States and foreign nations. Inevitably, an institution selling sterling, for instance,

must pay pounds to a counterparty before it will be credited with dollars in New York. In the intervening hours, a company can go into bankruptcy or an institution can be declared insolvent. Thus, the dollars may never be credited. Settlement risk has become a major source of concern to various supervisory authorities because many institutions are not aware of the extent of the risks involved. The Bank for International Settlements (BIS) has laid out the various risks in a paper that was published in July 1996.

Managing credit risk is the joint responsibility of the financial institution's trading department and its credit officers. A financial institution normally deals with corporations and other institutions with which it has an established relationship. Dealing limits are set for each counterparty and are adjusted in response to changes in its financial condition. In addition, most institutions set separate limits on the value of contracts that can mature on a single day with a particular customer. Some institutions, recognizing that credit risk increases as maturities lengthen, restrict dealings with certain customers to spot transactions or require compensating balances on forward transactions. An institution's procedures for evaluating credit risk and minimizing exposure are reviewed by supervisory authorities as part of the regular examination process.

## ACCOUNTING TREATMENT

Foreign-exchange transactions are generally entered into by banks for trading purposes and would be marked to market in current income. SFAS 52, "Foreign Currency Translation," establishes certain criteria that foreign-exchange transactions must meet to be considered a hedge and, therefore, accorded hedge-accounting treatment (see section 2120.1, "Accounting"). A gain or loss on a foreign-exchange transaction that meets the hedge-accounting criteria established by SFAS 52 should be deferred and included in the measurement of the related foreign-currency transaction.

## RISK-BASED CAPITAL WEIGHTING

The credit-equivalent amount of a foreign-exchange contract is calculated by summing—

1. the mark-to-market value (positive values only) of the contract and
2. an estimate of the potential future credit exposure over the remaining life of each contract.

The conversion factors are as follows.

<i>Remaining Maturity</i>	<i>Credit-Conversion Factor</i>
One year or less	1.00%
Five years or less	5.00%
Greater than five years	7.50%

If a bank has multiple contracts with a counterparty and a qualifying bilateral contract with the counterparty, the bank may establish its current and potential credit exposures as *net credit exposures* (see section 2110.1, "Capital Adequacy"). For institutions that apply market-risk capital standards, all foreign-exchange transactions are included in value-at-risk (VAR) calculations for market risk.

## LEGAL LIMITATIONS FOR BANK INVESTMENT

Foreign-exchange contracts are not considered investment securities under 12 USC 24(7th). However, the use of these instruments is considered to be an activity incidental to banking, within safe and sound banking practices.

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